I385.314
DRAF 3
c.3

St. Louis Metro Area Rail Gateway Enterprise

08250632

DRAFT ENVIRONMENTAL IMPACT STATEMENT Technical Supplement NATURAL SYSTEMS ANALYSIS

ILLINOIS DOCUMENTS
AUG 6 1981
ILLINOIS STATE LIBRARY

U.S. Department of Transportation

Illinois Department of Transportation

TECHNICAL SUPPLEMENT

NATURAL SYSTEMS ANALYSIS

ST. LOUIS METRO AREA RAIL
GATEWAY ENTERPRISE

Prepared for

Federal Railroad Administration

Illinois Department of Transportation
St. Louis MARGE
325 Missouri Avenue
East St. Louis, Illinois

ILLINOIS STATE LIBRARY

Prepared by

Sverdrup-Envirodyne-Knight
St. Louis, Missouri

June, 1981

1129 00260 5657

I385.314
DRAF
C.3

EXECUTIVE SUMMARY

This Report summarizes the baseline data obtained from state and local agencies, from literature surveys and from field reconnaissance for each of the Natural Systems subject areas: soils; water quality; floodplain hazards; ecological habitats; and air quality. The data has been analyzed to determine the long- and short- term changes in the environmental structure which might result from construction of the Metro Area Rail Gateway Enterprise (MARGE) project. Coordination with the appropriate agencies was maintained throughout all phases of the project in order to identify gaps in the data and ensure comprehensive ecological investigations.

The first chapter provides an abbreviated inventory of the study area's environmental setting. Descriptions of the physiography, soil types, geology and hydrology are given, along with summary assessment of current water and air quality conditions. The PROFILE also lists the natural habitats present within the study area. Individual assessment chapters follow the PROFILE, each giving the potential impacts of construction on each category of the environment. For each subject area, suggested methods for mitigating those impacts are included and consultations with appropriate agencies discussed.

To summarize the expected impacts: the potential exists for increased soil erosion and groundwater contamination during the construction stage; long-term impacts on water quality relate to increased rail activity and consequent pollution from substances used in track, engine and car maintenance; land consumed for construction will reduce acreages of both prime farmland and sensitive ecological habitats; air quality may be expected to improve; and flood plain encroachment varies from approximately 60 acres for the Two-Yard Plan to about 70 acres for either Three-Yard Plan. Either figure would be increased by 120 acres of floodplain encroachment at the TOFC yard site. For the most part, variation in impacts across the alternatives is not significant. Floodplain encroachment and loss of prime farmland are greater from the Three-Yard Plans, but there is little difference among the plans for air and water quality and soil impacts. Effects on natural habitats are greatest for the Common Trailer-on-Flatcar Yard, which could be constructed regardless of which yard configuration is selected. These effects include the loss of 57 acres of wetlands and 190 acres of old field habitats. Measures are available to minimize detrimental effects or to replace lost habitats and these are discussed individually by subject area.

Digitized by the Internet Archive
in 2018 with funding from
University of Illinois Urbana-Champaign

https://archive.org/details/naturalsystemsan00unse

TABLE OF CONTENTS

	Page
Executive Summary	i
Table of Contents	ii
Project Description	1
Study Area Environmental Profile	6
Soil and Groundwater Impacts	22
Impacts on Water Resources and Water Quality	37
Flood Hazards and Flood Plain Management	48
Impacts on Natural Habitats and Endangered Species	52
Air Quality Impacts	85
Conclusions	100
References	102

LIST OF EXHIBITS

A - Study Area	2
B - Affected Natural Environments	13a
C - Area of Potential Flooding - Ponding	13b
D - TOFC / COFC Site	67a

LIST OF TABLES

1.	USGS Water Resources Data	15
2.	Impacts on Prime Farmlands	25-27
3.	Properties of Soils in Study Area	28-29
4.	Groundwater Quality Analysis	36
5.	Illinois EPA Water Sampling Stations	38
6.	Wastewater Treatment Facilities	40
7.	Water Quality Impact Matrix	43
8.	Impacts of Two-Yard Plan on Natural Habitats	53
9.	Impacts of Three-Yard Directional Plan	54
10.	Impacts of Three-Yard Bidirectional Plan	55
11.	Impacts of the Common Elements on Natural Habitats	56-60
12.	Comparison of Four Representative Wetland Sites	63
13.	List of Agencies Contacted	66
14.	Probability of Occurence of Endangered Species	68-69

		Page
15.	Wetland Flora of the St. Louis Region	77-78
16.	Potentially Occurring Threatened or Endangered Species	82-84
17.	National Ambient Air Quality Standards	86
18.	Emissions Inventory for Railroads	87
19.	Locomotive Emission Factors	88
20.	Comparison of Total Pollutant Emissions from Corridor Operations for Each Alternative	90
21.	Grade Separation Crossing Identification	93-94
22.	Comparison of Carbon Monoxide Concentrations at Potential Grade Separation Sites	98

PROJECT DESCRIPTION

Background

The St. Louis railroad complex, alternately called a "gateway" or a "terminal", is of major importance to the national railroad network, and its vitality is critical to the industrial and economic health of the region. Geographically, it lies near the nation's center. Situated on the banks of the Mississippi, the Gateway takes in portions of the States of Missouri and Illinois. On the west side, the majority of the rail facilities lie near the river. On the east side, however, the network extends eastward some five miles to include the Alton & Southern (A&S) Corridor east of Washington Park. The major Illinois communities within the project area are East St. Louis, Granite City, Madison, Venice, Brooklyn, Cahokia, Centreville, Alorton, Dupo, Washington Park and Fairmont City. The southern boundary is the Bixby Rail Junction south of Dupo, and the northern boundary is Lennox Rail Tower in Mitchell. Exhibit A shows the St. Louis Gateway area.

The St. Louis Gateway is the second largest rail traffic routing center in the nation. The network includes track or facilities belonging to 14 major (Class I) railroad companies, and 3 Class II (switching) carriers. There are approximately 82 miles of mainline corridors in the gateway area. The sorting of cuts, or groups of cars, for delivery to individual railroads is mainly accomplished in two large common classification yards, Madison Yard on the north and Gateway Yard on the south. Specific classifications for distant points in the country are performed in a series of "home" yards where individual railroads also handle piggyback, or trailer traffic. Gateway Yard is operated by the Alton and Southern Railroad, while the Terminal Railroad Association (TRRA), a corporation composed of eleven railroads operating in the complex, manages the functions of Madison Yard. Individual roads are charged by either of these switching carriers for the rail cars which go through the classification process in their facilities.

EXHIBIT A

STUDY AREA

VICINITY MAP

LEGEND

- ROUTE 3 RELOCATION AREA
- RAILROADS
- INTERSTATES
- PROPOSED RAILROAD YARD
- CITY STREETS
- EXISTING RAILROAD YARD

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

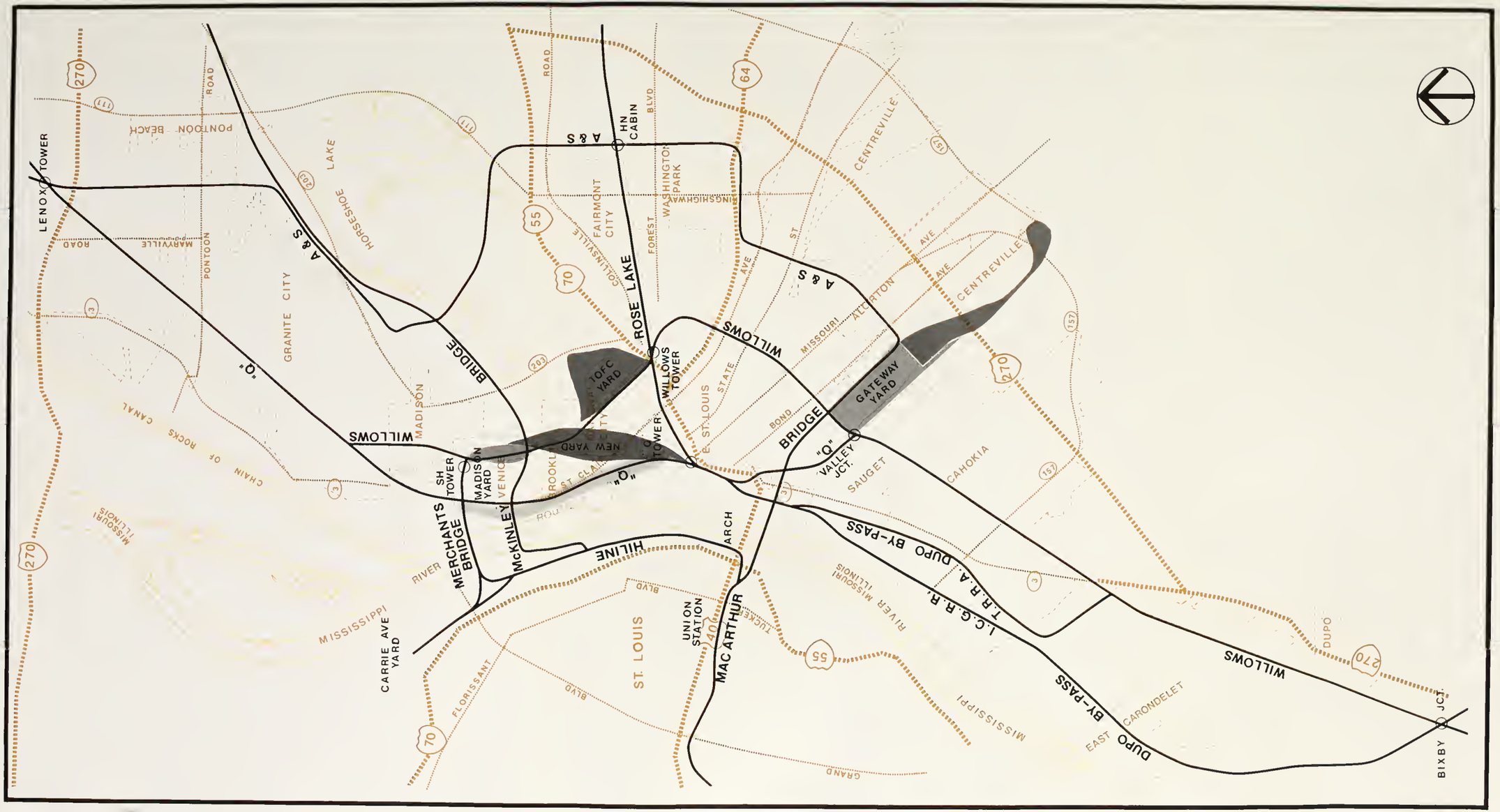

EXHIBIT A

STUDY AREA

VICINITY MAP

LEGEND

- ROUTE 3 RELOCATION AREA
- RAILROADS
- INTERSTATES
- PROPOSED RAILROAD YARD
- CITY STREETS
- EXISTING RAILROAD YARD

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

Railroad freight terminals, such as the one in St. Louis, are typically bottlenecks in the operation of rail systems. Increased rail traffic and age have reduced the efficiency of terminal operations and shipments often encounter excessive delays moving through congested switching and classification facilities. Facilities built early in the development of the rail system have become obsolete, but have continued to occupy sizeable amounts of land, constraining land use patterns and forming barriers to social and commercial activity.

In the St. Louis Gateway the situation is worsened by the continued presence of yards and tracks originally built near the river to hold cars awaiting the ferry crossing. These facilities became unnecessary as bridges were built and were used less and less until, in some cases, they were virtually abandoned. As in other urban rail terminals, this has served as a blighting influence on the area's economic development. Further, underutilized railroad properties do not yield tax revenues proportional to the amount of land they cover. The complicated network of yards and track has also produced a contorted street system where delays to vehicular traffic are frequent and lengthy. This combination of problems attributable to railroad influences has lead the Federal Railroad Administration (FRA), in concert with state and local officials, to seek ways to improve rail operations and to create valuable urban development opportunities by freeing riverfront land.

St. Louis Metro Area Rail Gateway Enterprise

The efforts of the FRA toward resolving the problems of the St. Louis Gateway through railroad improvements were focused into a three phase program entitled the Metro Area Rail Gateway Enterprise or MARGE. The program focused on accomplishing the following three objectives:

- To improve the efficiency of railroad operations within the St. Louis Terminal
- To reduce rail/community conflicts
- To provide opportunities for economic and community development.

Phase I, which was successfully completed in December, 1977, was limited to the development and preliminary examination of operationally feasible physical restructuring alternatives. This initial study was jointly directed by the Federal Railroad Administration and all the 17 railroads operating in the Terminal.

Phase II, which was begun in January, 1979, is a more comprehensive study to refine the restructuring plans and resolve the various railroad institutional issues as well as the community and environmental impact issues. Phase II includes estimation of costs and benefits for each of the railroads involved, together with a comprehensive cost/benefit analysis of the railroad restructuring, and will culminate in the publication of an Environmental Impact Statement. Managed by the Illinois Department of Transportation (IDOT), under contract to the FRA, Phase II has sought active involvement by the various local communities in the Gateway area, and continued the strong railroad role of Phase I.

Phase III involves final design engineering and actual construction of improvements to the rail yards and corridors in the terminal. It begins after an alternative plan for the restructuring is selected.

Restructuring Alternatives

There are currently some 63 railyards in the St. Louis Gateway. The MARGE project proposes consolidation of many of the smaller rail yards into two or three larger yard facilities. Three "build" alternatives are fully evaluated. Each alternative differs by the number of common carrier yards and by the routing of the corridor traffic. In addition, the existing 1979 conditions and the Year 2000 "No Build" alternative are analyzed and compared.

The actual yard restructuring alternatives exhibit differences in both the number of yards which would be constructed and the manner in which those yards would operate:

- Two-Yard Alternative - This plan calls for the expansion of the two existing classification yards. The Gateway Yard, located south of East St. Louis, would be expanded eastward. This area is partly within the boundaries of Centreville, Illinois and is currently agricultural and residential. The Madison Yard, which is just east of Venice, would be modified and expanded south past the residential areas of Brooklyn and National City.

- Three-Yard Directional Alternative - This plan involves the expansion of Gateway Yard, minor improvements to Madison Yard and the construction of a third yard, the "New Yard". This third yard would be located just south of Madison Yard, adjacent to the town of Brooklyn. Madison Yard would then function as an industrial support yard with the classification functions transferred to New Yard. The Directional distinction refers to the operational plan for the yards, which would have one yard handle trains coming from the East and headed West, and the other coming from the West and headed East.

- Three-Yard Bidirectional - This plan is distinguished from the above only in the operational plan of car and train routing. Each yard would route traffic in all directions. The physical configurations of the yards would be similar to the Directional Plan, except that the New Yard would be located approximately 200 feet further from the residential areas of Brooklyn, and that the expanded Gateway Yard would be constructed about 200 feet farther south from the housing areas of Centreville.

- No-Build Alternative - As a bench mark against which to analyze the "build" alternatives, a "no-build" situation has also been studied. This plan assumes that no improvements are made to the Gateway terminal. The No-Build Alternative assumes that the same traffic levels will exist in St. Louis in the Year 2000 as are projected for the Build cases. This traffic, to the extent it overtaxes the common classification yards, would be handled at individual rail yards.

Several elements of the consolidation are the same across all the "build" alternatives.

- A segment of Illinois Route 3 would be relocated in order to bypass the expanded yards. The designated section begins just north of Merchants Bridge in Madison County as four-lane highway and continues 3 miles south as a two-lane road throgh Venice and Brooklyn, past National City, ending at St. Clair Avenue in East St. Louis. The relocation would provide a two- or four-lane, limited-access highway for this distance.

- A common trailer-on-flatcar (TOFC) yard would be constructed east of Brooklyn and north of East St. Louis. The location is convenient to a major interchange connecting Illinois Route 203 and Interstate 70, providing excellent access for trucks. A major rail corridor runs just west of the site. Eight or nine of the thirteen Class I carrier would consolidate their TOFC, or piggyback operations into that one yard.

- There are approximately 82 miles of main line rail corridor in the project areas and much of this would be upgraded under all of the build alternatives. Track would be physically improved by laying new or replacement track and modern centralized signaling systems would be installed. Several new rail connections or interlockings would be constructed, but the locations of the corridors and existing interlockings would remain the same. Rail operations and train routings may vary across alternatives, but the basic corridor network does not.

- Seventeen-eighteen grade-separation structures are warranted under all the build alternatives, due to the large delay- and collision-related conflicts which occur in the project area. Five of these would be warranted because of yard expansions; the remainder are warranted due to conflicts along the rail corridors. Nine of these latter ten structures would also be warranted under the No-Build Alternative.

STUDY AREA ENVIRONMENTAL PROFILE

The geographic setting of the proposed MARGE project is the Mississippi River floodplain on the eastern, or Illinois, shore. The area specifically under consideration takes in portions of St. Clair and Madison Counties, extending from Dupo, north to Mitchell, Illinois. The study area stretches eastward, in a roughly semi-circular shape, from the river to the Alton and Southern rail corridor near Washington Park, Illinois.

The climate is Temperate-Continental with a mean annual temperature of about 56^{o} Fahrenheit, ranging from 32^{o} in January to 79^{o} in July. The area is, however, subject to sudden changes in temperature and weather conditions, and experiences temperatures considerably above and below these means. Summers are hot and humid, with temperatures frequently reaching above 100^{o}. While winters are relatively mild, extremes of cold with below zero temperatures are not uncommon. The area averages 4,750 heating degree days and 1,475 cooling degree days each year.

Average annual precipitation amounts to some 37 inches, with the heaviest rainfalls in the spring months. Relative humidity is 50 to 60 percent during the spring and summer. Part of the precipitation occurs in the form of snow during the five month period from mid-November to mid-April, averaging 17 inches per year. March normally records the most snow, while December, January and February are the driest months of the year. The growing season is approximately 200 days, enabling the cultivation of a variety of commercial agricultural crops, including corn, soybeans, winter wheat, and numerous truck crops.

The study area is rich in natural and geologic resources, including water and widespread deposits of sand, gravel, limestone, oil and coal. Most of these deposits are of a quality suitable for extensive mining. The high water table and ample groundwater are the most pronounced characteristics of the area and the thick deposits of clean granular material provide an excellent acquifier.

Specific environmental characteristics of the study area are outlined in this chapter in order to provide background for assessing the impacts of the St. Louis MARGE project on the ecology of the area. Included in the environmental inventory are descriptions of the area's Air Quality, Water Resources, Physiography, Soils, Natural Habitats and Flood Potential.

Physiography:

Most of the project area is within the physiographic region known as the American Bottoms. This flat region is part of the Mississippi River floodplain, and was formed as the river meandered between the bedrock valley walls. The American Bottoms is at an average elevation of about 415 feet above mean sea level (400-440), which is roughly 100 feet lower than the hilltops in the uplands immediately adjacent to the east.

The dominant morphologic features of the floodplain consist of meander scars (ridge and swale), and oxbow lakes (Horseshoe Lake is the largest) (Jacobs, 1971). Although this region is a floodplain, an extensive system of levees, drainage ditches and canals provides substantial flood reduction throughout most of the floodplain. Frequent flooding still occurs in many low lying areas, but this is usually due to water table fluctuations and runoff from within the floodplain and the uplands to the east.

Several physiographic regions have been defined in the American Bottoms by Yarbrough and Chiste (1972):

- The Lake Region encompasses a major portion of the project area. This region originally contained many oxbow lakes and marshy areas, most of which have been filled in with industrial and construction solid waste.
- The East St. Louis Rise Region in the center of the project area is a partially eroded and dissected alluvial fan. It is composed primarily of stream reworked loessial material washed down from the uplands to the east (Yarbrough, 1973).

- The Ridge and Swale Region lies immediately adjacent to the Mississippi River. This region has been subjected to the most recent cut and fill action of the river, and is generally discerned from older ridge and swale development by the alignment of the recent lineations roughly parallel to the river.

Soils:

The texture of the soils of the area vary from clays to sandy loams. The basal material is generally a dense sand. The soils on the flood plain are deposits of the Cahokia Alluvium while soils in the alluvial fans are deposits of the Peyton Colluvium.

The soils of the area are extremely variable. This is a result of alluvial deposits by the Mississippi River as it meandered throughout the floodplain. During flood stages and while meandering, the river deposited various sediments on the American Bottoms. These sediments are not continuous in the area. Between the floodings, plant growth became established on the flood plain and contributed to the organic content of the soil. This accounts for the varying depths of organic debris which have been reported from previous investigations. Some organic material is found in the topsoil and as deep as 65 feet. Some of these deeper deposits might possibly be pieces of weathered coal washed down from the uplands, an area where there is active coal mining today.

The Landes-Riley and the Darwin-Karnak soil associations dominate the area. The Landes-Riley roughly correlates with the Ridge and Swale and the East St. Louis Rise Physiographic Regions and the Darwin-Karnak seems to correspond fairly closely with the Lake Region.

The Landes-Riley Association is composed of roughly half Landes and half Riley soil series, with only about 5 percent minor soils. The Landes soils occupy the ridges and the Riley soils occupy the swales. The East St. Louis Rise area has a greater percentage of Landes and minor soil series.

The Landes soils are well drained and have a sandier texture than the adjacent Riley soils. The aquic moisture regime and poor drainage of the Riley soils causes severe limitations for certain types of non-farm uses.

The Darwin-Karnak Association is composed primarily of Darwin soils (70 percent), with half of the remainder (15 percent) dominated by Karnak soils and the other half (15 percent) a mixture of many minor soils. These soils have a deeper heavy texture than the Riley soils, though stratified sand and gravel is found at depth through the American Bottoms. Both the Darwin and the Karnak soils have high COLE (coefficient of linear extensibility) values, and are slightly to moderately acid. They are poorly drained and have an aquic moisture regime. Restrictions for most non-farm uses are severe.

Geology:

The geology of the study area is divided into two parts - the Paleozoic bedrock and the Quanternary alluvium which overlies it. The bedrock comprises the base on which more recent soil deposits were laid down. The uppermost bedrock units in the study area are of Mississippi age. The strata dip slightly to the east. A gentle NNW-SSE trending anticline is centered just west of the study area in St. Louis County and City. The axis of the anticline enters the very southern tip of the study area. A small oil field is associated with this structure in the vicinity of Dupo, Illinois. The bedrock in the eastern portion of the study area is part of the Lower Chesterian Series, which is composed of alternating sandstone and limestone units.

Most of the uppermost bedrock in the western portion of the study area is included in the Upper Valmeyeran Series. This series includes the Aux Vases, Ste. Genevieve, and St. Louis formations, and the dominant lithology of the series is limestone. The Aux Vases is a sandstone of variable thickness, and the St. Louis Limestone formation includes some

minor amounts of gypsum. A small portion of the southern part of the study area is directly underlain by the Salem Limestone, which is included in the Middle Valmeyeran Series.

The deposits laid down in the American Bottoms during the most recent geologic period are known as the Quaternary alluvium, and have been divided into two formations, the Henry Formation and the Cahokia Alluvium (William and Frye, 1970). The Henry Formation was deposited during the Pleistocene (Wisconsinan) and the Cahokia Alluvium is of Wisconsinan and Holocene ages. The Peyton Colluvium, contemporary with the Cahokia, is present only in alluvial fan areas washed by the Mississippi and its tributaries.

The Cahokia Alluvium is exposed at the surface throughout the project area. It is composed of the sands, silts and clays deposited by the Mississippi River. Silts and clays are dominant in old river channels, lakes and sloughs, and these accumulations of fine textured alluvium are locally as much as fifty feet thick. The texture of old bars and other parts of this formation tend to be coarser, and some relatively pure sand lenses are scattered throughout the project area. Interspersed throughout the Cahokia Alluvium are localized deposits or organic material (SIMAPC, 1978). These deposits are very compressible and pose significant problems for building foundations and other types of construction activities. Peyton Colluvium soils have a sandy texture and are rarely found on the surface. They are non-cohesive and have medium to high bearing strengths.

The Henry Formation underlies the Cahokia Alluvium. It was formed by the accumulation of outwash sands and gravels during the Wisconsin glacial era. This well-sorted, coarse alluvium is the major aquifer for high yielding wells in the American Bottoms. The thickness of this formation in the project area is highly variable, mostly dependent upon the thickness of the overlying Cahokia Alluvium.

Groundwater:

The project area is blessed with an abundance of groundwater resources. One of the highest yielding aquifers in the state partly underlies the area. This is the basal member of the alluvium which partially fills the Mississippi Valley region known as the American Bottoms. Underlying this alluvium are several bedrock aquifers. The bedrock uplands to the east also have a significant impact on the groundwater resources of the project area.

The alluvium in the area ranges from a feather edge at the base of the bluffs in the southeastern corner to over 120 feet thick near the center of the American Bottoms . Much of the upper portion of the alluvium is fine grained (silts and clays), and is not capable of transmitting much water. Although the texture is highly variable both laterally and vertically, the general trend is one of increasing grain size with depth. The highest yields are usually obtained from gravelly members of the Henry Formation (see the section on geology), just above the underlying bedrock.

Several pumping tests of this aquifer have been conducted (Schicht, 1965). Some of the highest reported values of the aquifers coefficient of permeability, over 3,000 gallons per day square foot (10^{-1} cm/sec), lie in the East St. Louis/Sauget area. Along with its abundance, the quality of the groundwater is generally good, although there have been localized instances of salinity and high content of sulphur and iron.

The utilization of the groundwater resource in the American Bottoms is fairly extensive. The largest use of groundwater is by industry. The amount of water withdrawn from wells has fluctuated significantly over the past several decades. Part of this fluctuation has been attributed to the closing and expanding of certain large industries. Recent decreases have been attributed to water conservation measures. Some of the large well fields adjacent to the Mississippi River induce recharge from the river. Most of the recharge for the aquifer comes from local precipitation although there is some seepage from the uplands.

The water table fluctuates signficantly throughout the year. The water table in the area close to the Mississippi River is directly affected by the stage of the river. During prolonged periods of high river stage, the water table is typically at or very close to the ground surface throughout much of the project area. Because of the levees and sandy subsoils, the potential for creating sand boils during high river stage must be carefully considered during any construction or demolition activities near the riverfront.

Flood Potential:

The project area is in that portion of the floodplain of the Mississippi River which falls within Madison and St. Clair counties in Illinois. The 86,000 acre floodplain is elongated north and south, approximately 23 miles long by 11 miles wide at the extremes. The existing major drainage system consists of natural streams and lakes, man-made channels and ditches, levees, gravity outlets, and pump stations. Area streams and channels are shown in Exhibit B, while Exhibit C shows potential flood areas.

High flood stages on the Mississippi River no longer cause direct flooding in the project area. A system of levees protect against the 200-year flood, which is a river stage of 52 feet at St. Louis. The river remains, however, as one of the indirect causes of interior flooding, when high river stages block the gravity glow of both surface and groundwater runoff, causing backwater ponding behind the levees. One or more pumping stations then operate to lift the water into the Mississippi. Interior flooding is the most prevalent and widespread problem in the basin, where the immediate problem is transporting the excess runoff from the upland areas via the canal system of the project area into the Mississippi River. Interior levees are often overtopped when the capacity of the canal or its pumping station is exceeded, and the flow spills onto adjacent areas resulting in the temporary ponding of water. Factors responsible for the flooding problems include the natural flatness of the terrain, poorly drained soils, the high ground water table, and inadequate channel capacity due to sedimentation and debris accumulation.

EXHIBIT B

AFFECTED NATURAL ENVIRONMENTS

VICINITY MAP

LEGEND

- RAILROAD TRACKS
- WATERWAYS
- PRIME FARMLAND
- SENSITIVE HABITAT
- EXISTING RAILROAD YARDS
- PROPOSED RAILROAD YARDS

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP / ENVIRODYNE / KNIGHT

EXHIBIT B

AFFECTED NATURAL ENVIRONMENTS

VICINITY MAP

LEGEND

- RAILROAD TRACKS
- WATERWAYS
- PRIME FARMLAND
- SENSITIVE HABITAT
- EXISTING RAILROAD YARDS
- PROPOSED RAILROAD YARDS

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

EXHIBIT **C**

AREA OF POTENTIAL FLOODING - PONDING

VICINITY MAP

LEGEND

100 YEAR CYCLE

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

EXHIBIT C

AREA OF POTENTIAL FLOODING - PONDING

VICINITY MAP

LEGEND

100 YEAR CYCLE

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP / ENVIRODYNE / KNIGHT

Major Drainage Systems:

The existing drainage system in the project area consists of natural streams and lakes, man-made channels and ditches, levees, gravity outlets, and pump stations. Stream and storm water runoff from both the eastern uplands and from within the area itself flows westerly to the Mississippi River. During high river stages, which may result in interior ponding and flooding, one or more pumping stations operate to lift the water into the river. Exhibit B shows the location of the major streams, canals, lakes and watersheds within the project area. The entire region lies within the Mississippi River drainage basin.

The northern portion of the project area lies within the Cahokia Canal System. This canal flows in a southwesterly direction through the City of East St. Louis to the Mississippi River. Principal tributaries include Canteen Creek and Schoenberger Creek. The Harding Ditch - Canal No. 1 combined system forms the major drainage network in the southern section of the project area. It flows generally west and south, passing through Holten State Park until it discharges into the east end of the Prairie DuPont Floodway. Several areas adjacent to the Mississippi River drain directly into it. These highly urbanized areas lie east of the riverfront levee and include major portions of Granite City, Madison, Venice, Sauget, Cahokia, and East St. Louis. The two major lakes in the area are Horseshoe Lake and the three lakes in Holten State Park.

Surface water discharge data is available from two United States Geologic Survey (USGS) gaging stations in the project; the Mississippi River at St. Louis and Canteen Creek at Caseyville. Table 1 lists the average, maximum, and minimum flows compiled for the two stations for the entire period of record.

Use of Water Resources:

The East St. Louis area contains three municipal water systems. The largest of these systems, operated by the East St. Louis and Interurban Water Company (ESLIWC), directly or indirectly supplies all the

TABLE 1

USGS WATER RESOURCES DATA
IN THE MARGE PROJECT AREA

Site	Location	Drainage Area	Average Discharge	Minimum Discharge	Maximum Discharge
Mississippi River at St. Louis, MO	Downstream side of west pier of Eads Bridge	697,000 mi^2 1,805,000 km^2	176,200 cfs 4,990 m^3/s	18,000 cfs 510 m^3/s	1,019,000 cfs 28,900 m^3/s
Canteen Creek at Caseyville, IL	400 feet upstream from bridge on State Highway 157	22.6 mi^2 58.2 km^2	16.9 cfs 0.479 m^3/s	0.0	10,200 cfs 289 m^3/s

Ref.: (6) Water Resources Data for Illinois, Water Year 1977. USGS.

municipalities in the area. The ESLIWC obtains its supply from the Mississippi River at the Chouteau Island and East St. Louis Pumping Stations. The Sauget Industrial area and the stockyards in National City receive their supply from groundwater sources (Metcalf & Eddy, 1976).

Stream use classification was recently defined by the Illinois Environmental Protection Agency (IEPA) for the major drainage-ways in the project area using the following categories: recreation, wastewater disposal, or urban/agricultural drainage. The primary stream use over most reaches in the Cahokia Canal is wastewater disposal (19 documented point sources). Canteen Creek, a major tributary to the Cahokia Canal, has a primary stream use of urban and agricultural drainage and to a lesser extent wastewater disposal. Horseshoe Lake has a primary use of recreation (duck hunting, fishing, boating, etc.) and agricultural and urban runoff. Two streams in the southern portion of the project area were also classified as to use. According to the Southwest Illinois Regional and Metropolitan Planning Commission (SIMAPC), the primary stream use of Harding Ditch is urban drainage and to a lesser degree non-game fishing, while Prairie DuPont Creek has primary uses of wastewater disposal and drainage with limited non-game fishing .

Water Quality:

The surface waters in the American Bottoms are generally man-made ditches and canals, designed to carry off surface runoff from the area. They are characteristically low flow streams with frequent ponding (SIMAPC 1978). None of the canals and ditches serve as water supplies due to low or intermittent flows (IDOC 1970). Their uses are primarily flood control, limited recreation and fishing, and as receiving waters for domestic and industrial effluent dischargers (SIMAPC 1978). Such ditches generally offer poor habitat conditions because they fluctuate greatly in flow and clarity, lack varied and stable bottoms, are subject to periods of low dissolved oxygen (DO) concentrations, suffer periodic flushing by floods, suffer severe winter conditions, and the presence of inorganic toxins (Horner & Shifrin 1973, 1974 & SIMAPC 1975).

Several major sources of water pollution exist within the project area. These include both the point sources of municipal and industrial wastewater effluent and the non-point sources of agricultural runoff, coal mine wastes, and septic tank effluent (SIMAPC 1972, 1978). The urbanized areas present a significant source of water pollution in the form of urban storm runoff. Industrial activities, commercial districts, and housing developments all contribute pollutants which eventually become part of the runoff water. Urban runoff problems are increased in municipalities with combined sewer and storm drain systems, designed to handle both domestic wastewater and urban runoff.

Four existing primary wastewater treatment plants serve the project area and there are approximately a dozen industries that provide individual treatment and disposal of their process wastes. Others pre-treat their wastes before discharging to existing sewer systems (Metcalf & Eddy, 1976). There are a number of areas associated with both deep mines and strip mines which contribute to water pollution. Water quality degradation has occurred in parts of the study area, but high natural alkalinity levels in many streams usually provides adequate natural bufferings. The high level of farming in the American Bottoms is the major cause of erosion and sedimentation to downstream lakes and streams. Other types of agricultural wastes can enter the water via surface runoff and leaching.

The project area lies essentially in three watersheds: Cahokia Canal, Harding Ditch, and the Mississippi River itself. The general water quality of each of these watersheds reflects their individual water pollution sources and land uses. The Mississippi River is the final receiving water for all of the surface and groundwater passing through the American Bottoms. Violations of standards for various pollutants have been found along the river. The Cahokia Canal and the Harding Ditch are tributaries of the Mississippi River.

The Cahokia Canal system includes the Canal itself, Horseshoe Lake, and Canteen Creek, a major sub-watershed. The northern portion of the project area drains directly into the Cahokia Canal, for which water

quality data also indicate that pollution standards are frequently exceeded. Other elements within the watershed show various water quality violations as well.

The Harding Ditch drainage system includes Cahokia Canal No. 1, the Blue Waters Ditch, Prairie DuPont Floodway, Prairie DuPont Creek, Goose Lake Ditch, Dead Creek, and the three Holten State Park Lakes. The southern portion of the project area is drained by the Harding Ditch combined drainage area. All three of the lakes within Holten State Park have been deteriorating recently due to silt deposition and fluctuating water levels (IDOC 1979). General Stream Standards applied by the IEPA have been exceeded at various times and a recent Corps of Engineers study concluded that the waters of the Harding Ditch drainage area were relatively sterile, with only a few pollution tolerant benthic species found in the shifting mud and sand substrate (Horner & Shifrin 1973).

Ecological Habitats:

The area of proposed expansion and renovation of railroad yards and lines is centered in the East St. Louis section of the American Bottoms. The topography of the area has been shaped by the Mississippi River and local weather patterns through erosion and deposition. The two contrasting topographical features within the area are the floodplain, which borders the river, and the uplands, which rise 100 to 150 feet above the bottoms. The drainage patterns generally run from east to west from the uplands to the Mississippi River through the floodplain.

There are seven varieties of habitats within the study area. Each has encountered differing degrees of human disturbance (SIMPAC 1978). They include urban, cultivated fields, old fields, wetlands, stream, riverine and lentic habitats:

- Urban Habitats are located in residential, commercial and light industrial areas. This is the dominant habitat type within the study area andis characterized by lawns, buildings, vacant lots and rail yards with interdispersed vegetation. The animal life that resides in this habitat has adapted to close human contact and the native flora of urban

areas is limited by the concentration of the human population and development of the area. The floral composition of the heavily industrialized and populated areas is comprised principally of non-indigenous species.

- Cultivated Field Habitats rank second in size to the remainder of the study area. The crops are mostly soybeans, corn and milo, producing a very good yield per acre depending upon local precipitation. These fields provide only temporary food and cover for area wildlife. After the fields are plowed, the wildlife must seek food and shelter in surrounding habitats. The value of cultivated fields as wildlife habitat is, therefore, seasonally limited.

- Old Field Habitats are in a transitional stage from abandoned fields, pasture or cultivated fields to lands with a larger, more permanent floral composition. These habitats constitute the third largest type within the study area. They are also often considered marginal in biological importance because they contain few stable associations of plants and no species which are not also present in one or more of the other habitats, but old fields are of great value in a ecological sense, providing a rich mixture of available food and cover for numerous small mammals, birds and insects.

- Wetlands were once the predominant habitat type in the study area (Corps of Engineers, St. Louis District, 1974). Today, however, they are restricted to relatively small tracts, depressions, or borrow pits along road and railroad rights-of-way, drainage ditches, and borders of lakes. Most of the previous wetland areas have been drained or filled for urban or agricultural development, and the remaining wetlands in the study area are significant because of the variety of organisms which they support, the high probability of encountering rare species within them, and the rapid rate at which they have been lost to development and agriculture.

- Aquatic Habitats (Riverine) within the study area include lakes, streams and riverine surface waters. The Mississippi River bisects the study area with a levee system paralleling the river on the Illinois side. The land bordering the river in the Gateway area is heavily industrialized, thus limiting associated wetland and bottomland habitat. Aquatic habitat conditions in the river within the study area are less diversified than other non-industrialized areas with less dredging, barge traffic, and municipal and industrial waste discharges.

- Lotic Habitats (Streams) within the study area have been heavily disturbed. The larger streams have been dredged and channelized and riparian vegetation has been severely reduced by urban development. The majority of streams in the study area are characterized as urban, industrial and agricultural

drainage ditches with little or no recreational value and poor water quality, shifting soft substrates and intermittent flows. These conditions do not promote a diversity of flora and fauna within the aquatic ecosystem.

- Lake (Lentic Habitats) and Pond Systems within the study area are represented by three lake and pond systems of significance (IDOC 1970). They are relatively shallow old stream channels with relatively high nutrient levels, fairly high turbidity, and shallow areas supporting signficant wetland vegetation (IDOC 1970). Both invertebrate and vertebrate fauna are numerous. A variety of migratory waterfowl and shorebirds also use the existing lakes. Fish populations are principally of the "wide-ranging" group.

Current Air Quality Status:

The location of the proposed project includes portions of St. Clair, Madison, and Monroe Counties. Current National Ambient Air Quality Standards (NAAQS) for carbon monoxide and oxides of nitorgen have been attained throughout each of these three counties and the attainment status of these pollutants is projected to continue for the foreseeable future. Each of these counties is currently designated non-attainment for photochemical oxidants. Consequently, the State of Illinois has developed a State Implementation Plan (SIP), designed to bring about attainment of the oxidant standard, and attainment is projected to occur some time after 1982 and before 1987.

The entire portion of St. Clair County and parts of Madison and Monroe Counties have not attained primary NAAQS for total suspended particulates (TSP). The remaining portions of Madison and Monroe Counties have not attained secondary TSP standards. Reanalysis of projected TSP concentration in these three counties, currently underway, indicates that portions of these counties will continue to exceed secondary standards (and possibly primary standards, as well) during the foreseeable future.

All of St. Clair and Monroe Counties and a large portion of Madison County are designated attainment for sulfur dioxide, and this is expected to continue. However, Illinois EPA is currently reanalyzing a portion of Madison County which extends from Alton/Wood River toward Edwardsville and which is currently designated unclassified. The status of this

portion of Madison County may be redesignated non-attainment in the future. No designations concerning the attainment status for the lead standard have been made at this time (1, 2).

Current emissions resulting from railroad operations comprise 0.3% to 5.5% of the total pollutant emissions in the Illinois portion of the Air Quality Control Region (AQCR 70), depending on the pollutant involved. Emissions of particulates, carbon monoxide, and sulfur oxides from rail operations are each 0.3% or less of total emissions, while emissions of hydrocarbons and oxides of nitrogen are somewhat more significant, compared with total area-wide emissions.

Summary:

After existing environmental conditions in the study area were inventoried, the changes which would result from constructing the railroad improvements were projected, to determine the effects on specific natural categories. The following sections describe the analyses conducted during this assessment process.

The location of the rail facilities in an area rich in agricultural land makes it virtually impossible to construct any improvements without encroaching on some prime farmland. Parcels of such land are scattered among the construction sites, but most are located contiguous to developed areas with existing sewer, water and utility lines. In these cases, acquisition and construction is not expected to encourage development into other prime agricultural areas. The entire project area may be defined as "urban fringe", affecting its growth potential so that urban activity could be expected to encroach on many of the sites within the next two decades whether the improvements were built or not. Consideration of the farmland issue was included in the decision process, and the weighing of all factors resulted in yard and corridor configurations described in the PROJECT DESCRIPTION. During and after the construction all the facilities, as far as practicable, all guidelines for preserving prime agricultural lands will be observed.

The soils described in the ENVIRONMENTAL PROFILE were also classified according to the American Association of State Highway Officials system, which ranks soils as to their suitability for construction. Properties used to evaluate this capability include grain size distribution, liquid limits and plasticity. The scale ranges from A-1, soils with the highest bearing strengths, to A-7, the least suitable soils with low bearing strengths. Ideal soils are those with a mixture of grain sizes and medium moistures and plasticities.

The study area's sand deposits can probably be classified as either A-2-4 or A-2-5, sands with varying amounts of gravel, silt, and clay. Two numbers are used to distinguish the separate soil properties; the first represents grain size and the second moisture content. The overlying material can probably be classified A-4 to A-6. A-4 soils are generally silts to clayey silts and A-6 soils are silty clays and lean clays. Both sand and gravel have been reported by previous investigations in the study area by the Illinois Geologic Survey, but sand is more prevalent than gravel. Gravel is generally found at depths exceeding 60 feet.

The deposits are generally loosely consolidated. The shear strength of the sediments is low because the water content is high. During periods of heavy rainfall as well as during the spring thaws, the valley will tend to flood. Levees have been constructed to control surface water runoff. However, during times of high water, the pressures of the groundwater may increase within the protected areas.

Some soils contain soft, compressible organic soils which may settle under applied loads. There are clays present which have a tendency to shrink or swell with the decrease or increase of water content, and would, therefore, be poorly suited for construction causing cracking in building foundations. Some sediments present at, or near, the ground surface may be susceptible to frost heave, also hazardous for structures not designed to handle it.

With these general characteristics in mind, the soils in the specific yard areas were examined to identify potential hazards for construction. The locations of the proposed improvements were characterized as follows:

- Gateway Yard contains areas with surface layers of fill as much as ten feet thick, above 20 feet of silty clays and silts which overlie a dense sand. However, the deposits vary in thickness and the top of the sand layer seems to undulate, sometimes occuring at depths exceeding 60 feet or as shallow as six feet.

  Not only do the sediments vary in depth and thickness, but they are also discontinuous laterally. The reason for this may be the type of depositional environment existing earlier, in which ancient meander scars, abandoned by the river, became filled with organic debris and colluvial material. The sediments deposited within these feature would then be different from those outside them. The age of the Mississippi River Valley increases the probability that numerous buried meander scars exist there.

- Madison Yard soil conditions appear to be even more variable than those at the Gateway Yard. The sand can be as shallow as one foot. The maximum depth to the top of the sand cannot be determined at this time, but the sediments on top of the sand vary from clays and silty clays to clayey silts and silts. There are also sediments with varying amounts of organic contents at various depths. The location of Madison Yard at the west end of an existing oxbow lake would also probably result in lateral soil variability for the reasons mentioned above.

- New Yard subsurface soil conditions are probably very similar to the existing conditions at the Madison Yard, with the exception of a ballast layer originally laid down prior to rail construction there.

- TOFC Yard displays Karnak as the dominant soil type (62 percent), which has severe limitations for construction due to wetness, low strength and a high shrink-swell capacity. A high shrink-swell capacity, as well as frequent flooding, poses severe limitations on the soils for non-agricultural land uses. The TOFC Yard contains the highest acreage of prime farmland of any proposed construction site. Two hundred seventy acres (or approximately one half of the TOFC Yard) is being cultivated for row-crop production.

Exhibit B (Natural Environments) shows the location of the soils within the construction sites which qualify as prime agricultural farmland, according to soil type. Table 2 lists the amount of prime farmland and soil series occurring within the construction sites. Table 3 lists the properties of the soils within the project area.

Effects for the No-Build Plan:

As a first step in the evaluation of the project's impacts, the effects of continuing current conditions was estimated. If the decision was not to construct any of the proposed alternatives, there would be no impact on the existing prime farmland. Localized instances of groundwater polution from railroad sources would probably continue and might increase depending on traffic levels.

Effects for the Two-Yard Plan:

Gateway Yard improvements would consume approximately 430 acres of additional land under the Two-Yard Plan. Some 30% of these acres have soils with high shrink swell potential, which are susceptible to flooding. These limitations would be addressed when construction plans are prepared. The most significant impact will be the loss of 92 acres of prime farmland, all of which is presently under row-crop production.

The expansion of Madison Yard proposed under the Two-Yard Plan would require approximately 145 acres of land. Approximately 79 percent of this land is classified by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) as urban land (Table 2). This land type

TABLE 2

IMPACT OF CONSTRUCTION ON PRIME FARMLAND SOILS

Construction Site	Land Affected (acres)		Prime Farmland (acres)		Soils Present in the Construction Site	
					Percent	Name:Map Unit
Madison Yard Three Yard Directional & Bidirectional	160	27 cultivated 133 uncultivated	26	24 cultivated 2 uncultivated	79 5 2 7 4 3	Urbanland:533 Parkville:619 Nameoki:592 Riley:452 Landes:304B Darwin:71
Madison Yard Two Yard Alternative	145	30 cultivated 115 uncultivated	34	30 cultivated 4 uncultivated	74 2 6 3 15	Urbanland:533 Nameoki:592 Riley:452 Landes:304B Darwin:71
New Yard Directional	395	81 cultivated 314 uncultivated	53	43 cultivated 10 uncultivated	71 8 5 1 5 4 3 3	Urbanland:533 Parkville:619 Nameoki:592 Fults:591 Riley:452 Karnak:426 Landes:304B Darwin, Variant:V71
New Yard Bidirectional	390	78 cultivated 312 uncultivated	51	41 cultivated 10 uncultivated	73 8 5 1 4 4 2 3	Urbanland:533 Parkville:619 Nameoki:592 Fults:591 Riley:452 Karnak:426 Landes:304B Darwin,Variant:V71
Gateway Yard Three Yard Bidirectional	440	97 cultivated 343 uncultivated	92	92 cultivated 0 uncultivated	5 8 11 25 5 5 1 10 10 20	Orthents:802 Parkville:619 Riley:452 Riley, Urban:U452 Wakeland:333 Landes:304B Fayette:280B Otter:76 Darwin, Urban:U71 Darwin, Variant:V71

TABLE 2 (continued)

IMPACT OF CONSTRUCTION ON PRIME FARMLAND SOILS

Construction Site	Land Affected (acres)		Prime Farmland (acres)		Soils Present in the Construction Site	
					Percent	Name:Map Unit
Gateway Yard Two Yard and Three Yard Directional	430	96 cultivated 334 uncultivated	91	91 cultivated 0 uncultivated	5 8 11 25 5 5 1 10 10 20	Orthents:802 Parkville:619 Riley:452 Riley, Urban:U452 Wakeland:333 Landes:304B Fayette:280B Otter:76 Darwin, Urban:U71 Darwin, Variant:V71
TOFC Yard All Alternatives	457	270 cultivated 187 uncultivated	105	90 cultivated 15 uncultivated	5 14 62 15 4	Parkville:619 Riley:452 Karnak:426 Landes:304B Darwin, Variant:V71
WR Interlocking	0.1	0 cultivated 0.1 uncultivated	0		100	Urbanland:533
40th Street Interlocking	2.6	0 cultivated 2.6 uncultivated	0		70 30	Darwin:71 Beaucoup (wet):1070
NKP Interlocking	2.0	1.5 cultivated 0.5 uncultivated	0.3	0.3 cultimvated 0 uncultivated	80 10 5 5	Orthents:802 Fults:591 Landes:304B Tice:284
NKP (ITRR)	7	7 cultivated 0 uncultivated	3	3 cultivated 0 uncultivated	20 30 20 30	Beaucoup (wet):1070 Landes:304B Tice:284 Beaucoup:70
Bixby Junction	6	5 cultivated 1 uncultivated	5	5 cultivated 0 uncultivated	70 30	Riley:452 Darwin:71
SO Interlocking	1.7	0 cultivated 1.7 uncultivated	0		100	Urbanland:533
HN Cabin Interlocking	5.6	0 cultivated 2 uncultivated	5.6	0 cultivated 5.6 uncultivated	20 80	Riley:452 Darwin:71

TABLE 2 (continued)

IMPACT OF CONSTRUCTION ON PRIME FARMLAND SOILS

Construction Site	Land Affected (acres)		Prime Farmland (acres)	Soils Present in the Construction Site	
				Percent	Name:Map Unit
Tolson Interlocking	2	0 cultivated 2 uncultivated	0	100	Urbanland:533
Willows Interlocking	2.6	0 cultivated 2.6 uncultivated	0	50 50	Orthents:802 Karnak:426
SH Interlocking	2	0 cultivated 2 uncultivated	0	100	Urbanland:533

Maximum amount of prime farmland lost 289 acres

Minimum amount of prime farmland lost 235 acres

TABLE 3

PROPERTIES OF SOILS IN STUDY AREA

Soil Name:Map Unit	Depth (inches)	Permeability (inches/hr)	Shrink-Swell Potential	Flooding		Depth to Water Table (feet)	Depth to Bedrock (inches)	Drainage	Erosion Hazard	Prime Agricultural Land
				Frequency	Duration					
Urbanland:533	Paved areas and buildings make up more than 75 percent of the area. Identification of soils not feasible.									No
Darwin(wet):1071	0-60	0.06	Very high	Frequent	Long	Water table is above surface from Nov-Jul	60	Percs. slowly floods	Slight	No
Beaucoup(wet):1070	0-60	0.6-2.0	Moderate	Frequent	Long	Water table is above surface from Nov-Jul	60	Percs. slowly floods	Slight	No
Parkville:619	0-15 15-60	0.06-0.2 0.06-2.0	Moderate Low	Frequent	Brief	1.0-2.0	60	Floods, wetness	Slight	Yes
Nameoki:592[a]	0-11 11-60	0.06 0.6-2.0	High Low	Occasional	Brief	1.0-3.0	60	Percs. slowly floods	Slight	Yes[b]
Fults:591[a]	0-32 32-60	0.06 0.6-6.0	High Moderate	Frequent	Brief	0-2.0	60	Percs. slowly Floods	Slight	Yes[b]
Riley:452	0-60	0.6-2.0	Moderate	Frequent	Brief	1.0-3.0	60	Favorable	Slight	Yes[b]
Riley,Urban:U452	0-60	0.6-2.0	Moderate	Frequent	Brief	1.0-3.0	60	Favorable	Slight	No
Karnak:426	0-5 5-60	0.06-0.2 0.2	Very high Very high	Frequent	Long	0-3.0	60	Percs. slowly wetness	Slight	No
Wakeland:333	0-60	0.6-2.0	Low	Frequent	Brief	1.0-3.0	60	Floods, wetness	Slight	Yes[b]

TABLE 3 (continued)

PROPERTIES OF SOILS IN STUDY AREA

Soil Name:Map Unit	Depth (inches)	Permeability (inches/hr)	Shrink-Swell Potential	Flooding		Depth to Water Table (feet)	Depth to Bedrock (inches)	Drainage	Erosion Hazard	Prime Agricultural Land
				Frequency	Duration					
Landes:304B	0-13 13-60	2.0-6.0 6.0-2.0	Low Very low	Rare	-	3.0-6.0	60	Not needed	Slight	No
Tice:284	0-60	0.6-2.0	Moderate	Frequent	Brief	1.0-3.0	60	Favorable	Slight	Yes[b]
Fayette:280B	0-10 10-60	2.0-6.0 0.6-2.0	Low Moderate	None	None	6.0	60	Not needed	Slight	Yes
Sarpy:92B	0-8 8-60	2.0-6.0 6.0	Low Low	Frequent	Brief-long	6.0	60	Not needed	Slight	Yes[b]
Beaucoup:70	0-60	0.6-2.0	Moderate	Occasional	Brief	0-2.0	60	Floods	Slight	Yes[b]
Otter:76	0-60	0.6-2.0	Low	Frequent	Brief	0.20	60	Floods, wetness	Slight	Yes[b]
Darwin:71	0-60	0.06	Very high	Occasional	Long	0-2.0	60	Percs. slowly floods	Slight	Yes[b]
Darwin Variant:V71	0-27 27-36 36-60	0.06 0.06 6.0-2.0	High High Low	Occasional	Brief	0-2.0	60	Percs. slowly floods	Slight	Yes[b]
Darwin Urban:U71	0-60	0.06	Very high	Occasional	Long	0-2.0	60	Percs. slowly floods	Slight	No

NOTES: [a]Proposed series
[b]Qualifies as prime farmland if flooding is less frequent than once in 2 years during the growing season and the soil is drained.

consists of areas covered by buildings and pavement. Urban land is so altered by cuts and fills that identification of soils is not feasible. Paved areas and buildings make-up more than 75 percent of the area. Only about 25 percent of the area to be taken supports vegetation, mostly grass borders and widely spaced trees and shrubs. The susceptibility of the soils to erosion is low (Table 3), mainly due to the fairly level topography. However, during construction when vegetative cover is destroyed by cut and fill operations, considerable amounts of soil may be eroded if appropriate soil conservation measures are not taken to stabilize soils exposed on excessively high slopes. Thirty-three acres of prime farmland will be lost as a result of construction. Most of this land is under row-crop production. The possibility of ground water pollution during construction (short-term impact) or over the long term, is not considered a threat.

In summary, for the Two-Yard plan approximately 575 acres would be needed and 124 of them are prime farmland, under cultivation. This land is contiguous to developed areas with existing sewer water and utility lines. In this case, therefore, the acquisition and construction is not expected to encourage development into other prime agricultural areas. Erosion effects would be addressed by landscaping and some filling would be done to minimize the soil construction limitations.

Three-Yard Directional Plan Effects:

Expanding Gateway Yard has impacts similar to those under the Two-Yard Plan. Approximately 440 acres will be affected by constructing the yard. The most significant impact will be the loss of 92 acres of prime agricultural farmland, all under row-crop production. Approximately 30 percent of the soils have a high shrink-swell potential and are subject to frequent flooding. These limitations must be addressed when constructing on these soils.

Some modifications will be made to the Madison Yard to allow it to serve as industry support. These changes will require 160 acres and the impacts will be similar to those under the Two-Yard Plan. There may be some susceptibility to erosion, which can be minimized by normal soil conservation measures. Twenty-six acres of prime farmland, presently under row-crop production will be lost as a result of construction.

Construction of the New Yard would affect approximately 390 acres of land. Approximately 70 percent of the construction area is classified as urban land. However, a substantial amount of cultivated land exists in this area. Eighty acres of land is presently being cultivated for row-crop production and 50 of them qualify as prime farmland. The susceptibility of the soils to erosion and potential for polluting the groundwater is slight if proper mitigative measures for the control of erosion are used.

The summation of the effects for the Three-Yard Directional reveals that 985 acres would be required for the yard improvements. One hundred and fifty of these acres are prime farmland, all of which is under cultivation. Erosional effects and construction limitations on this land will be mitigated through vegetation and filling. Ballast will be laid down as a base for railroad track and facilities. The loss of prime farm land is of concern, but here again, the proximity of all of this acreage to previously developed land lessens the impact of its loss since urban expansion could be expected to consume it within several decades.

Effects of the Three-Yard Bidirectional Plan:

Impacts for the Gateway Yard expansion are similar to those under the other two restructuring alternatives. Approximately 440 acres will be affected by constructing the yard. The most significant impact will be the loss of 92 acres of prime agricultural farmland, all under row-crop production. Approximately 30 percent of the soils have a high shrink-swell potential and are subject to frequent flooding. These limitations must be addressed when constructing on these soils.

The Madison Yard expansion affects approximately the same amount of acreage as it would under the other alternatives. Aside from requiring slightly fewer prime agricultural acres in the Three-Yard Plans, there is little difference among the three plans' impacts on Madison Yard. The susceptibility of groundwater pollution during construction for the short term and long term is not considered a threat.

The New Yard under the Three Yard Directional and Bidirectional Alternatives has similar impacts since both plans are very similar. It would affect approximately 390 acres of land. Approximately 70 percent of the construction area is classified as urban land. However, a substantial amount of cultivated land exists in this area. Eighty acres of land is presently being cultivated for row-crop production and 50 acres qualifies as prime farmland. The susceptibility of the soils to erosion and potential for polluting the groundwater is slight if proper mitigative measures for the control of erosion are used.

In summary, the impacts of both Three-Yard Plans are similar. Some 990 acres would be consumed under the Bidirectional Alternative. Approximately 160 of these are prime farmland lying adjacent to urban areas and, therefore, susceptible to continuing development. Erosional effects and construction limitations on all land acquired will be mitigated through vegetation and filling. Ballast will be laid down as a base for railroad track and facilities.

Effects of the Common Elements:

Project elements which are included in all of the alternatives are; the construction of a common Trailer-on-Flatcar (TOFC) yard; the construction of a number of rail connections, (interlockings) which would allow more efficient use of rail corridors; the relocation of a segment of Illinois highway Route 3; and the upgrading of some 82 miles of rail corridor. The soil and groundwater impacts of these elements would, of course, be the same across the alternatives.

The TOFC yard would require some 450 acres of land. As noted previously, the soils at the location selected for the TOFC yard have low bearing strengths and high shrink-swell potential, experiencing frequent flooding. All of these characteristics pose problems for construction. The main impact will be a loss of prime farmland totaling 105 acres. The TOFC Yard contains the highest acreage of prime farmland. Two hundred seventy acres (or approximately one half of the TOFC Yard) is presently being cultivated for row-crop production.

Another concern is the dumping of non-metallic waste in the wetlands along the southern part of the proposed yard. This waste consists mainly of foam and rubber which has a very poor structural stability. If the TOFC Yard is built, portions of this illegally dumped material will have to be excavated and hauled to a licensed landfill. The actual excavation of the refuse may have some immediate detrimental impacts on groundwater quality, since at the present time, the characteristics of the refuse are not known. Once the material has been hauled to a licensed landfill, the net long term impact will likely be the improvement of water quality.

Of the nine interlockings to be constructed under all build alternatives, only four would affect prime farmland (a total of less than 20 acres), and two others would impact wetland areas (less than 5 acres in total). The 40th Street Interlocking will affect 1.5 acres of wetlands. Proper mitigative measures can insure against excess erosion and subsequent sedimentation of the adjacent wetland and the small size of the affected parcels decreases the significance of loosing the farmland. The NKP (IT) Interlocking incorporates 7 acres of cultivated fields, 3 of which are prime farmland. A corner of Horseshoe Lake (0.2 acres) is incorporated into the construction area. The slope of the land adjacent to Horseshoe Lake is approximately 5 percent. During construction activities, proper control measures must be utilized to avoid erosion of the land.

The NKP Interlocking incorporates a small portion of prime farmland (less than 1 acre). The most significant impact would be the loss of .25 acres of wetland, part of which is being filled with rock and gravel.

Improvements to Bixby Junction would affect 6 acres of prime farmland now under row-crop production. At present, 1 acre has already been affected by the construction of new Interstate 255/270. HN Cabin Interlock involves the loss of 5.6 acres of prime farmland presently under grass vegetation. Tolson, Willows and SH Interlockings do not affect any prime farmland or wetlands.

The relocation of Route 3 would be implemented under any of the build alternatives. Three variations have been proposed for relocating the highway, differing in their alignment with respect to Q Rail Corridor, on the east or the west side of the corridor or split with one or two traffic lanes on each side of the corridor. The Technical Supplement entitled Relocation of Route 3 provides more details. All three Plans involve the loss of 6 acres of prime farmland. A wetland area affected by these alternatives is a small section of the southwest corner of the Horseshoe Lake system. The impacts on the surrounding wetland area would be minimal if proper soil erosion control practices are utilized. The West Plan involves the additional loss of 0.3 acres of surface water west of Q Corridor. The short term impact would be to increase sedimentation in the 4 acre lake, however, the long term impact is negligible if bank stabilization is accomplished.

Description of the soil types affected by the corridor additions would not be feasible since the 11 by 27 mile square project area (dissected by a network of rail lines) would encompass many soil types varying in type over a very short distance. The main impact will be the loss of narrow strips of farmland parallelling the existing tracks. In areas where wetlands are encroached upon, proper mitigative measures will insure that the adjacent wetlands are not significantly affected by sedimentation.

Summary:

The amount of prime farmland lost due to construction or expansion of railroad yards, interlockings, and Route 3 relocation varies from 235 to 289 acres (not including that caused by corridor additions). Approximately 1200 total acres of land would be directly affected by construction. Although not quantifiable, the susceptibility of the soils to erosion during construction is a potential impact which would be overcome by following erosion and sediment pollution control procedures

in order to protect the surrounding farmland and wetlands. Staged grading and revegetation should be planned so that a minimum of soil surface is exposed at any one time. This may be assured by including soil and sediment pollution control plans in construction contracts.

Effects on Groundwater Quality:

The quality of the groundwater in the project area is highly variable. Although generally of good quality, some saline and high sulfate water has been encountered. High iron content is also a problem in some areas.

Some degradation of the quality of the water in the upper part of the aquifer has occurred. Phenol concentrations in excess of 10 milligrams per liter (mg/l) have been measured in the Sauget area, while chemical oxygen demand (C.O.D.) measurements in excess of 800 mg/l and iron concentrations in excess of 100 mg/l have been found in groundwater samples in the Fairmont City area (IEPA, 1979). These are not typical values, but indicate the degree of localized degradation that has occurred. Table 4 is a summary of water quality analyses more typical of the project area. With the exception of the wetland being filled in at the TOFC Yard, none of the construction is expected to affect the quality or quantity of the groundwater within the project area in either the short or long term.

TABLE 4

GROUNDWATER QUALITY ANALYSES

Water Quality Analyses from Water Supply Wells[a]

Well Number	1	2	3	4	5
Depth of Well (feet)	110	110	100	115	100
Date Collected	5/22/70	10/26/72	5/3/78	3/23/54	10/9/72
Fe (mg/l)	11	12	2.4	1.9	2.6
Mn (mg/l)	-	0.57	0.35	-	-
Ca (mg/l)	-	-	97.6	-	-
Cl (mg/l)	28	29	33	5	106
Total Hardness (mg/l)	536	510	342	436	400
Sulfate (mg/l)	-	93.4	75.5	-	190.3
Total Dissolved Minerals (mg/l)	635	616	418	434	700

Water Quality Analyses From Shallow Monitoring Wells[b]

Well Number	6	7	8	9
Depth of Well (feet)	36	36	23	20
Date Collected	12/22/77	10/19/78	11/29/78	12/19/78
C.O.D. (mg/l)	44	22	36	280
Chloride (mg/l)	833	10	16	230
Calcium (mg/l)	-	119	110	278
Iron (mg/l)	0.6	22.3	3.0	139
Sulfate (mg/l)	-	115	105	250
Total Dissolved Minerals (R.O.E. 180°C)	3060	570	540	1360
Hardness (mg/l as $CaCO_3$)	-	500	160	900
Manganese (mg/l)	-	0.98	0.37	10.8

NOTES: [a] Illinois State Water Survey, 1979.
[b] IEPA, 1979.

The Illinois Pollution Control Board sets the water quality standards for Illinois waters (IPCB guidelines). The three major water quality standards are: General Standards, Effluent Standards, and Public and Food Processing Water Supply Standards. Each individual standard is applied whenever a specified beneficial use is to be maintained. The General Standards are stream standards designed to protect the state's water for aquatic life, contact use, agricultural use, and most industrial uses. Effluent Standards set the maximum concentrations of various contaminants that may be discharged by industries and municipalities. Standards for Public and Food Processing Water Supply apply at any point at which water is withdrawn for treatment and distribution as a potable supply. Since this includes drinking water, the Public and Food Processing Water Supply standards are the most rigorous of the three.

The Illinois Environmental Protection Agency's (IEPA) water quality network provides the most extensive continuous chemical and physical monitoring data collected during the past years for area Illinois surface waters. Table 5 lists area IEPA stations and their locations.

Current Water Quality:

The urbanized area of metropolitan East St. Louis presents a significant source of water pollution in the form of urban storm runoff. The industrial activities, commercial districts, and housing developments all contribute pollutants which eventually become part of the runoff water. Pollutants in storm water runoff include solids, organic materials, fecal coliforms, and metals. The problems associated with urban runoff are increased when a municipality has a combined sewer system, where both domestic wastewater and urban runoff discharge into a common sewer system. A large part of the project area is served by combined sewers; the major municipalities are Venice, East St. Louis, National City, Sauget, and Madison (SIMAPC 1978).

TABLE 5

IEPA WATER QUALITY NETWORK SAMPLING STATIONS
IN THE MARGE PROJECT AREA

Station Number	Site	Location
J 01	Mississippi River	0.5 miles NW of East Carondelet
J 02	Mississippi River	East St. Louis water intake north of Chateau Island
J 03	Mississippi River	Alton water intake 2 miles above US 67 Bridge
J 81	Mississippi River	US 50 Jefferson Barracks Bridge
J 82	Mississippi River	St. Louis water intake 0.2 miles south of Chain of Rocks
JMA 01	Cahokia Canal No. 1	New Route 3 Bridge at North Dupo
JMAA 01	Prairie DuPont Creek	Route 163 Bridge 4 miles north of Millstadt
JMAC 01	Harding Ditch	State St. Bridge NE of Holten State Park
JMAC 02	Harding Ditch	Lake Drive at Frank Holten State Park
JN 01	Cahokia Canal	Route 3 Culvert near National City
JN 02	Cahokia Canal	Sand Prairie Lane Bridge SE of Horseshoe Lake
JNA 01	Canteen Creek	Sand Prairie Lane Bridge SE of Horseshoe Lake
JNA 02	Canteen Creek	Route 157 Bridge at Caseyville
JNF 01	Horseshoe Lake	Bend Road off Route 203 at Alton and Southern Railroad Bridge

Four existing primary wastewater treatment plants presently serve the project area. Table 6 lists each facility and the municipalities served. In addition, there are approximately a dozen industries that provide individual treatment and disposal of their process wastes, and several industries that pre-treat their wastes before discharging to existing sewer systems (Metcalf & Eddy, 1976).

Approximately 760 acres associated with deep mines in Madison County, and some 555 acres associated with deep mines and 769 acres of strip mined land in St. Clair County contribute to water pollution. Water quality degradation has occurred in parts of Richland Creek, Canteen Creek, and Cahokia Creek and its tributaries. However, water quality sampling data indicates high natural alkalinity levels in most reaches of these streams which usually provides adequate natural bufferings.

Agricultural pollution levels tend to be rather high in the intensely farmed American Bottoms (SIMAPC 1972). Farming is the dominant land use throughout the area, and is the major cause of erosion and sedimentation to downstream lakes and streams. Other types of agricultural wastes can enter the water via surface runoff and leaching. The most common chemical pollutants are pesticides, fertilizer nutrients, and livestock waste (SIMAPC 1972).

The project area lies essentially in three watersheds: Cahokia Canal, Harding Ditch, and the Mississippi River itself. The general water quality of each of these watersheds reflect their individual water pollution sources and land uses. The Mississippi River receives all of the surface waters. The Cahokia Canal and the Harding Ditch are tributaries of the Mississippi River.

The Cahokia Canal system includes the Canal itself, Horseshoe Lake, and Canteen Creek, a major sub-watershed. The Harding Ditch drainage system includes Cahokia Canal No. 1, the Blue Waters Ditch, Prairie DuPont Floodway, Prairie DuPont Creek, Goose Lake Ditch, Dead Creek, and the three Holten State Park Lakes.

TABLE 6
WASTEWATER TREATMENT FACILITIES

Facility	Communities Serviced	Level of Treatment	Effluent Discharged To	Predominant Type of Waste Treated	1975 Average Flows (MGD)
Cahokia(1)	Alorton, Cahokia Centreville	Primary	Dead Creek	Domestic	2.9
Lansdowne(1)	Brooklyn, Caseyville, Fairmont City, Madison, National City, Venice, Washington Park	Primary	Cahokia Canal	Industrial & Domestic	5.5
East St. Louis	City of East St. Louis	Primary	Mississippi River	Industrial & Domestic	12.8
Sauget	Village of Sauget	Primary	Mississippi River	Industrial	8.0

NOTE: (1) Cahokia and Lansdowne plants operated to East Side Levee and Sanitation District (ESLSD).

REFERENCE: Facilities Plan and Environmental Assessment (21).

The Mississippi River is the final receiving water for all of the surface and groundwater passing through the American Bottoms. Several IEPA sampling stations are located on the River, including two which are on water intakes and are thus subject to the more stringent Public and Food Processing Water Supply standards. Violations for fecal coliform, copper, manganese, iron, mercury, and phenol have been found along the river.

The northern portion of the project area around National City, Fairmont City, and northern East St. Louis drains directly into the Cahokia Canal. Water quality data for the Cahokia Canal is available from two IEPA stations, one just upstream from its confluence with Canteen Creek, and one farther downstream in National City. The fecal coliform standard has been frequently exceeded at both stations, as well as DO, ammonia, copper, iron, fluoride, cyanide, and mercury.

Horseshoe Lake is a major detention basin for the Cahokia Canal watershed. There is one IEPA station on the west side of the lake which flows into the Canal. Standards violated include DO, pH, fecal coliform, iron, fluoride, ammonia, and phosphorus. The Lake is also heavily eutrofied with an average depth of about two feet.

Canteen Creek drains a small watershed which includes agricultural bottomlands and some acid mine drainage in the uplands before discharging into the Cahokia Canal. There are two IEPA stations located on Canteen Creek, one at Caseyville where the stream emerges from the uplands into the Bottoms and one prior to its confluence with the Cahokia Canal. Fecal coliform violations are continuous, for the most part, at the Canteen Creek sample stations with frequent violations of iron, copper, manganese, and occasionally high metals.

The southern portion of the project area in Centreville, Cahokia, Alorton, Sauget, and most of East St. Louis is drained by the Harding Ditch combined drainage area. Water quality data is available from two IEPA sampling stations located on Harding Ditch just upstream of Holten State Park, and a third station is located downstream on Cahokia Canal No. 1. A fourth station is located in the uplands on the Prairie DuPont Creek tributary.

All three of the lakes within Holten State Park have been deteriorating recently due to silt deposition and fluctuating water levels (IDOC 1979). General Stream Standards have been exceeded for DO, fecal coliform, iron, copper, lead, manganese, and pH at various times at the IEPA stations within the Harding Ditch watershed. A recent Corps of Engineers study concluded that the waters of the Harding Ditch drainage area were relatively sterile, with only a few pollution tolerant benthic species found in the shifting mud and sand substrate (Horner & Shifrin 1973).

Expected Water Quality Impacts:

For a realistic assessment of the effects of building the railroad improvements, it was necessary to estimate what the effect would be of the continuation of current conditions. The short-term and long-term impacts of the No-Build Alternative on the existing water quality in the project area would be minor. Runoff of oils and fuels from rail operations, as well as de-icing agents and herbicides from the rail line maintenance, would continue in localized areas. The potential for pollutants to enter area surface and ground waters would increase in proportion to the increase in the volume of railroad traffic.

The water quality impacts of building the Two-Yard, Three-Yard Directional, or Three-Yard Bidirectional Alternatives would be similar and are discussed together. Each of the three build alternatives would affect Schoenberger Creek, the Holten State Park lakes, Cahokia Canal, Harding Ditch, Horseshoe Lake, and the Mississippi River. The impacts are summarized in Table 7.

Short-term impacts, defined as temporary, construction-related effects, would occur in any water body within the project area located near construction activities. Erosion and the resultant silt deposition in the stream channels would probably occur during any significant rainfall. Impact on water of affected streams include sedimentation, increased turbidity, and nutrient release (nitrate and phosphate). In

TABLE 7
WATER QUALITY IMPACT MATRIX

Affected Segment Drainage	A&S Corridor Addition	TOFC Yard	Madison Yard Expansion	Gateway Yard Expansion	NKP Interlocking Modification	Ill. Route 3 Intersection	Commerical Relocations
Schoenberger Creek	1	1,2					
Holten Lakes	1						
Cahokia Canal		1,2	1,2				
Harding Ditch/ Canal No. 1				1,2			
Horseshoe Lake					1	1,2	
Un-named lake owned by Union Electric						1,2	
Mississippi River							1

Notes:
1) short term impact related to construction of the proposed alternative
2) long term impact related to operation and maintenance of new facilities

addition, heavy construction equipment would leak fuels, oil, grease and other organic chemical during normal operations. These and any accidental spills during construction would be flushed into nearby streams, especially during rainfall.

Measures required by the Illinois Department of Transportation to control erosion during construction would minimize water quality impacts on the affected streams. These measures could be expected to retain most of the solids that would otherwise enter the waterways (IDOT Water Quality Manual, 1977). These measures should be considered during the final engineering design and implemented during construction.

The proposed corridor improvements, additions, connections or interlocking modifications that could present a water quality impact are the A&S Corridor Addition and the NKP Interlocking Modification. All other corridor options should not negatively affect water quality during construction or operation and some may, after construction, even reduce pollutants (such as oil, grease, fuels) due to increased switching efficiency and reducing delays, etc.

The A&S Corridor Addition is located in the headwaters of Schoenberger Creek, east of Washington Park near a wetlands area. Construction of an additional mainline in this area could lead to erosion and sedimentation the creek (Table 7). As with all short-term construction in the project area for any alternative, sedimentation and the resultant silt deposition in the stream channels, as well as deposition of nutrient (nitrate and phosphate) bearing soil particles, would probably occur during any significant rainfall. Impacts on water quality of the affected streams would be silt deposition, increased turbidity, and nutrient release (possibly stimulating the growth of aquatic vegetation). Measures required by the Illinois Department of Transportation to control erosion during construction would minimize water quality impacts on the affected streams. These measures can be expected to retain approximately 80 percent of the solids that would otherwise enter the waterways (IDOT 1977).

Here again, leaks and spills from heavy construction equipment are potential sources of pollution for nearby streams, particularly during periods of rain. Thus, Schoenberger Creek, and all other proposed construction sites, will be susceptible to these short-term water quality impacts. Essentially the same situation exists at the southern end of the proposed corridor addition. Several lakes in Holten State Park could be adversely affected by the sedimentation from the construction of additional mainline track, since the existing track lies close to several small ponds in the park.

The other corridor/interlocking alternative potentially affecting water quality is the NKP Interlocking Modification located on the west side of Horseshoe Lake. The existing curvature of the track is to be substantially reduced, and thereby requiring construction which will infringe upon and into Horseshoe Lake. Short term construction related impacts upon water quality (as previously discussed) could affect this segment of the Lake.

Another component of all the build alternatives is the Common TOFC Yard. Schoenberger Creek, which becomes a channelized ditch before discharging into Cahokia Canal, would be affected by the construction of this yard. The proposed TOFC yard would be located in an area that would completely cover the extreme downstream channelized section of the Creek. Thus, this portion of Schoenberger Creek would have to be either relocated or routed underground via some sort of tunnel. The actual construction impacts on hydrology and water quality to the channelized portion of Schoenberger Creek and Cahokia Canal would probably be restricted to the construction of the tunnel, or the stream relocation. Impacts on the hydrology of the Creek should be negligible, especially since this reach of the creek is already channelized.

Long-term impacts on water quality of the TOFC yard upon water quality should likely be restricted to pollutant runoff to nearby drainage-ways. The TOFC yard would be an area concentrated with locomotives, semi-trailers, and a wide variety of cargos. Substances such as

fuels, oils, and any spilled materials, as well as de-icers and herbicides used for yard maintenance, would be concentrated in the runoff water and could produce a localized, severe impact on the receiving stream if no pre-treatment exists.

The potential exists in the TOFC yard during normal operations for an accidental spill which could contaminate the shallow alluvial aquifer in the the project area. The specific chemical nature of the contaminant would determine if, and how rapid, it would pollute the groundwater. Although most municipalities in the project area obtain potable water from surface sources, numerous active, industrial wells are located throughout this aquifer in the project area.

Impacts on water quality due to the Route 3 relocation would be construction related. A portion of a small lagoon which receives process water discharges from Union Electric's Venice power plant would be affected by loops of an intersection. This lagoon is considered to have no recreational value. The east loops will be built close to Union Electric's lagoon, but not directly over it. Short-term impacts on water quality would be construction related. The only perceived long-term effects of both alternatives will be highway runoff of grease and oil, either directly or indirectly.

Another part of the Illinois Route 3 relocation involves a proposed section to be built perpendicular to Route 3 to the east and over the western tip of Horseshoe Lake. The short-term impacts of this road would be construction related. Long-term water quality impacts of the road during normal use include highway runoff (fuel, oil, grease) directly into Horseshoe Lake and possible elimination of recreational activities in the immediate area of the highway.

In the northern end of the project area, the expansion of the Madison Yard to the south and the New Yard would involve construction in close proximity with the existing above and below ground sections of the Cahokia Canal. The proposed expansion of the Gateway Yard, in the

southern project area, would involve construction of tracks, over a section of Harding Ditch near the terminus of Illinois Route 163. This would require either bridges for the track over Harding Ditch, the construction of track over an underground section, or the rerouting of Harding Ditch. Construction related to the yard expansion would create the potential for short-term impacts to water quality.

The hydrology of the two major drainage-ways could be affected, depending on finalized site plans. The Madison Yard expansion could include sections of Cahokia Canal that are both above and below ground (for both the Two-Yard and Three-Yard alternatives). Flows would have to be relocated or diverted underground. A portion of this area currently floods (a wetlands at present) and would have to be filled during construction. This is primarily interior flooding, however, a 200 year flood from the Mississippi River would inundate this area.

Harding Ditch may have to be rerouted since the Gateway Yard expansion is proposed to be located over a portion of this waterway. Approximately one-half mile of the Harding Ditch/Canal No. 1 system and right-of-way would be affected by this alternative.

All locomotive engine repair and car maintenance facilities within the new or expanded rail yards would be serviced by a waste collective system. Any fuel spills, car wash water, or oil leakage would be treated by an oil-water separator before discharge.

The potential for chemical spills exists for any yard facility and with it the possibility of contaminating the area's shallow alluvial aquifer. The nature of the spill would determine the speed with which it was absorbed into the ground water system. Industrial wells located throughout the aquifer could be affected. Plans to control accidental spills would be developed and implemented through the new fire and emergency stations to be built as part of Gateway/New Yards.

Both the Harding Ditch and Cahokia Canal systems in the project area generally have inadequate channel capacity. Canteen Creek, Prairie DuPont Creek, Schoenberger Creek, Schoolhouse Branch, Holten State Park Lake #3, Cahokia Canal, Canal No. 1, and the Harding Ditch are all subject to overbank flooding. When runoff from the smaller, inadequate secondary drainage ditches and storm sewers in the project area cannot discharge into the overflowing major channels, it is forced to pond outside the levees, often further aggravating the flooding of adjacent lands. Water is retained in low-lying areas and sloughs until the recession of the water level in the major channels allows the water to flow away.

Exhibit C illustrates those portions of the project area which are subject to flooding. Base flood plain limits were determined by using Department of Housing and Urban Development flood insurance maps. For areas where HUD maps were unavailable, the best available information was used. The floodplain is defined as all lowland and relatively flat areas that are subject to a one percent or greater chance of flooding in any given year (100 year floodplain). The Exhibit shows areas which would be inundated during the 100 year storm. Less severe storms would cause flooding in most of the same localized areas but not to the same extent.

Impacts of the No-Build:

For a realistic assessment of the effects of building the railroad improvements, it was necessary to estimate what the effect would be of the continuation of current conditions. If the decision was not to construct any of the proposed alternatives, there would be no impact on the existing storm water management or flood plain management systems in the project area. Localized sites of interior flooding would continue in the areas shown in Exhibit C. The Corps of Engineers has proposed several improvements to reduce the flooding in Centreville.

A new ditch to be constructed known as the ICRR Ditch would allow water falling on Centreville to exit and empty into the Goose Lake Ditch immediately downstream. Approximately 4,700 feet of earth channel, with a bottom width of 5 feet and 1 on 3 side slopes, would be constructed upstream of the Illinois Central Railroad tracks. The average depth would be about 6 feet. From that point and continuing about 4,100 feet until the channel intersects Goose Lake Ditch, a 10-foot bottom width would be provided. The depth would vary from 5 to 14 feet in this reach. Three 84-inch CMP culverts would be constructed. Two of the three culverts would extend under roads and one under the Illinois Central Railroad tracks. The proposed ditch would be extended downstream to insure that no flooding would occur downstream due to this new outlet.

Impacts of Construction:

The impacts on the flood plain from constructing the Two-Yard, Three-Yard Directional, or the Three-Yard Bidirectional Alternatives would be similar and are discussed together. Since all rail facilities are currently located in the floodplain, improvements will obviously also take place within areas susceptible to flooding. Therefore, all regulations governing construction in floodplains will be observed. Coordination with the U.S. Army Corps of Engineers was initiated during the scoping process and has continued during the assessment of flood hazards. If any of the build alternatives are selected, there would be construction activities which could affect the drainage systems. Consultation would be maintained with the Corps of Engineers to minimize negative effects.

Short-term impacts due to construction would occur if sediment and debris accumulate in the streams, ditches, and culverts. This could reduce the water carrying capacity of the ditches and would further aggravate the interior flooding problem. Adequate measures to control erosion should be considered during the final engineering design phase and implemented during construction. Drainage system components to be affected include:

- The present Cahokia Canal in the vicinity of National City passes through two major box culverts of approximately 650 ft. and 1,900 ft. in length. Under Two-Yard Alternative, there would be no change in the configuration of the canal. If either of the Three-Yard Alternatives is selected, the present 1,900 ft. culvert would be abandoned and the existing 650 ft. culvert extended approximately 1,900 ft. to the northeast through the limits of the New Yard. A relocated canal would be constructed along the east side of New Yard. Approximately 3,800 ft. of new channel would replace some 3,300 ft. of open channel to be abandoned, a 500 ft. increase.

- Under any of the build alternatives, an additional bridge approximately 100 ft. long would be built over the Harding Ditch parallel to Route 157 immediately southeast of the Church Road intersection.

- The existing Schoenberger Creek would be relocated due to the new TOFC facility under each of the build alternatives. It would be rerouted on the west side of the yard into the Cahokia Canal as a surface water channel. Approximately 200 feet of the Creek would be piped underground.

- The proposed ICRR Ditch to be constructed in Centreville would have to be relocated in order to accommodate the expanded Gateway Yard. The final engineering design of the yard should be coordinated with the Corps of Engineers to determine the location of the ICRR Ditch.

All of the changes to the drainage systems would be designed to be compatible with the existing facilities. Each project would be of adequate water carrying capacity to accommodate the design year storm flow designated for the system it serves. In addition to meeting all of the normal engineering design standards, all of the projects affecting a major drainage facility would be reviewed by and subject to permitting by the United States Army, Corps of Engineers or other responsible agency.

The proposed new and expanded rail yard facilities would be constructed in floodplain areas under each build alternative. Those floodplains include areas of Centreville where the Gateway Yard would be expanded, the TOFC Yard site, and the surrounding areas of Brooklyn where the New Yard or expanded Madison Yard are proposed.

Each new yard construction would involve the filling in of portions of the floodplain. This would reduce the land available for the storage of excess water during major flood events. This excess water would store

elsewhere, thus flooding areas adjacent to the floodplains. Residential areas of Brooklyn and Centreville currently not subject to flooding could be impacted under the project. Encroachment of construction into the floodplain amounts to some 60 acres for the Two-Yard Plan, and approximately 70 acres for either of the Three-Yard Plans. Floodplain areas to be affected in the TOFC Yard site amount to approximately 120 acres.

The proposed action should minimize the filling of the floodplain where ever possible. The incorporation of new drainage facilities with the designs of the new yards would lessen flooding impacts. The redesign of the proposed ICRR Ditch to accommodate the Gateway Yard would reduce the flooding in Centreville, resulting in a positive impact. Similarly, improving the drainage at the New Yard site could improve conditions in Brooklyn. All new bridges, upgraded corridors, and Route 3 relocation should preserve the natural drainage and accommodate the water carrying capacity of the existing ditches and canals. Continuing consultation with the US Army Corps of Engineers will be sought to assure the adequacy of all drainage facilities.

The area of proposed expansion and renovation of railroad yards and lines is centered in the East St. Louis section of the American Bottoms. The topography of the area has been shaped by the Mississippi River and local weather patterns through erosion and deposition and drainage patterns generally run from east to west from the uplands to the Mississippi River through the floodplain.. There are two contrasting topographical features within the area:

- The floodplain, which borders the river and has highly organic and poorly drained soils, and
- The uplands, which rise 100 to 150 feet above the bottoms and are a portion of the eastern upland loess-covered till plain.

The proposed construction sites with newly acquired properties include Madison Yard, New Yard, Gateway Yard, corridor additions and renovations, corridor interlocking modifications, and the Route 3 relocation alternatives. The properties to be acquired for these sites have been investigated and the habitat descriptions and dimensions are included in Tables 8 through 11. The habitats included in the overall land acquisitions are: old fields, agricultural land, wetland, riverine, stream, and urban habitats. The impacts of construction will be addressed in the EIS for each area of proposed construction with respect to the existing habitat and their floral and faunal components. Their association with other natural ecological systems in the area will also be assessed.

Threatened and endangered species have been addressed through coordination with the U.S. Fish and Wildlife Service (FWS) and the endangered species program of the Illinois Department of Conservation (IDOC) (Table 16), a literature search and field surveys. There were no threatened or endangered species encountered during field surveys. However, it has been pointed out by IDOC and through literature, that there are existing habitats within the study area that may presently harbor these species of flora and fauna.

TABLE 8
IMPACTS OF TWO-YARD PLAN ON NATURAL HABITATS

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitagative Measures
Madison Yard	Cult. Field	disruption	total loss	34.4 acres	1	Revetetate areas not being used - between tracks, yard borders, etc.
	Old Field	disruption	partial loss	55 acres	1	" "
	Urban	disruption	partial loss	5.1 acres	1	" "
Gateway Yard	Cult. Field	disruption	total loss	97 acres	1	Revegetate unused areas not being used - between track, yard borders, etc.
	Old Field	disruption	partial loss	239.6 acres	2	" "
	Urban	disruption	partial loss	74 acres	1	" "
	Stream (Harding Ditch)	disruption - siltation increased turbidity	partial loss of aquatic and riparian habitat	700 feet	2	Construct during dry months - use erosion control, revegetate stream banks with appropriate wetland vegetation.
	Wetlands	disruption - filling	partial loss	4 acres	2	Apply erosion control vetetative buffer. Revegetate with wetland species.

TABLE 9
IMPACTS OF THREE-YARD DIRECTIONAL PLAN ON NATURAL HABITATS

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitagative Measures
Madison Yard	Cult. Field	disruption	total loss	27 acres	1	Revegetate areas not being used, between track, yard borders, etc.
	Old Field	disruption	partial loss	52 acres	1	" "
	Urban	disruption	partial loss	20 acres	1	" "
	Stream (Cahokia Canal)	disruption - siltation - increased turbidity	partial loss	400'	1	Maintain stream as surface water - employ erosion con-control. Revegetate whereever possible, construct during dry months.
Gateway Yard	SAME AS TWO-YARD ALTERNATIVE					
New Yard	Cult. Field	disruption	total loss	81.3 acres	1	Revegetate areas not being used, between track, yard borders, etc.
	Old Field	disruption	partial loss	138 acres	1	" "
	Urban	disruption	partial loss	27 acres	1	" "
	Stream (Cahokia Canal)	disruption - siltation - increased turbidity	partial loss	3,120'	1	Maintain stream as surface water - employ erosion. con-control. Revegetate with riparian vegetation, construct during dry months. Parallel vegetative buffers.

TABLE 10
IMPACTS OF THREE-YARD BIDIRECTIONAL PLAN ON NATURAL HABITATS

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitagative Measures
Madison Yard	SAME AS THREE-YARD DIRECTIONAL ALTERNATIVE					
Gateway Yard	Cult. Field	disruption	complete loss	95.7 acres	1	Revegetate unused lands between tracks, yard borders, etc.
	Old Field	disruption	partial loss	235.6 acres	2	" "
	Urban	disruption	partial loss	71.4 acres	1	" "
	Wetland	disruption - filling	partial loss	2.4 acres	2	Employ erosion controls, revegetate distrubed area with appropriate wetland species, construct during dry months, use vegetative buffers.
	Stream (Harding Ditch)	disruption - siltation increased turbidity	partial loss	700'	1	Maintain stream as surface water - employ erosion controls, construct during dry season. Revegetate disturbed areas with wetland species, use vegetative buffers.
New Yard	Cult. Field	disruption	complete loss	78 acres	1	Revegetate unused lands between tracks, yard borders, etc.

TABLE 10 (Continued)

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitagative Measures
New Yard	Old Field	disruption	partial loss	138 acres	1	" "
	Urban	disruption	partial loss	72 acres	1	" "
	Stream (Cahokia Canal)	disruption - siltation increased turbidity	partial loss	3,120'	1	Maintain stream as surface water - employ erosion controls, construct during dry season. Revegetate with riparian vegetation. Parallel vegetative buffers.

TABLE 11
IMPACTS OF COMMON ELEMENT ON NATURAL HABITATS

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitigative Measures
TOFC/COFC	Wetland	disruption - filling	complete loss	57	2	Purchase area of comparable size in American Bottoms and construct wetland and - constribute to Horseshoe Lake Conservation Program. Revegetate unused lands-use vegetative buffers and erosion control.
	Stream (Shoenberger Creek)	disruption - siltation increased turbidity	partial loss of aquatic and riparian habitat	1-1/3 mile	1	Reroute as surface water to Cahokia Canal. Revegetate with appropriate riparian vegetation. Perform construction during dry months. Use erosion control.
	Old Field	disruption	partial loss	190 acres	2	Revegetate unused areas not being used - between track, yard borders, etc.
	Cult. Field	disruption	partial loss	80 acres	2	" "
	Urban	disruption	partial loss	20 acres	2	" "

IMPACTS OF COMMON ELEMENTS ON NATURAL HABITATS (Continued)

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitigative Measures
Corridor Alterations						
Additions						
Q Corridor	Urban	disruption	complete loss	2,350'x50' x12.3 acres	1	Revegetate unusued or disturbed areas.
	Old Field	disruption	complete loss	4,625'x50'	1	" "
A&S Corridor	Urban	disruption	partial loss	14,780'x50'	1	" "
	Wetland	disruption	complete loss	1,500 x 50'	1	Erosion control-revegetation disturbed areas with wetland species.
	Cult. Field	disruption	complete loss	7,085' x 50'	1	
	Old Field	disruption	complete loss	7,250' x 50'	1	Revegetate unused or disturbed area.
Dupo By-Pass Corridor	Urban	disruption	partial loss	1,655' x 50'	1	" "
	Old Field	disruption	complete loss	1,050' x 50'	1	" "
	Cult. Field	disruption	complete loss	10,550' x 50'	1	" "
Willows Corridor	Old Field	disruption	complete loss	5,280' x 50'	1	" "
	Urban	disruption	partial loss	3,275' x 50'	1	" "
	Cult. Field	disruption	complete loss	6,050' x 50'	1	" "

IMPACTS OF COMMON ELEMENTS ON NATURAL HABITATS (Continued)

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitagative Measures
Rose Lake Corridor	Old Field	disruption	complete loss	700' x 50'	1	Revegetate unused or disturbed area.
Hi Line Corridor	Urban	disruption	partial loss	2,350' x 50'	1	" "
	Old Field	disruption	complete loss	2,000' x 50'	1	" "
Merchants Bridge Corridor	Urban	disruption	partial loss	800' x 50'	1	" "
	Old Field	disruption	complete loss	4,800' x 50'	1	" "
Interlocking Modifications						
W.R. Interlocking	Old Field	disruption	complete loss	100' x 50'	1	Revegetate unused and disturbed areas.
40th St. Inter.	Wetland	disruption - siltation	partial loss	1.5 acres	1	Revegetate remaining wetland and disturbed areas with wetland species, control erosion.
	Old Field	disruption	complete loss	2,800' x 50'	1	Revegetate unused land.
NKP Interlocking	Wetland	siltation, disruption	complete loss	200' x 50'	1	Erosion control and revegetation of unused areas with wetland use vegetative buffers.
	Cult. Field	disruption	complete loss	4,495' x 50'	1	Revegetate unused and disturbed areas.

IMPACTS OF COMMON ELEMENTS ON NATURAL HABITATS (Continued)

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitigative Measures
NKP (ITRR) Interlocking	Cult. Field	disruption	complete loss	4,495' x 50'	1	Revegetate unused and disturbed areas.
Bixby Junction	Cult. Field	disruption	compelte loss	1,350' x 50'	1	" "
S O Interlocking	Urban	disruption	complete loss	1,400' x 50'	1	" "
HN Cabin Interlocking	Old Field	disruption	complete loss	930' x 50'	1	" "
Tolson Interlocking	Urban	disruption	complete loss	850' x 50'	1	" "
Willows Interlocking	Wetland	siltation - disruption	partial loss of habitat	550' x 50'	2	Revegetate with wetland species - use vegetative buffers, erosion control.
	Old Field	disruption	complete loss	1,480'x 50'	1	Revegetate unused and disturbed areas.
	Urban	disruption	complete loss	875' x 50'	1	" "
Valley Junction	Old Field	disruption	complete loss	5,450'x 150'	1	" "
	Cult. Field	disruption	complete loss	7,100'x 100'	1	" "
SH Interlocking	Cult. Field	disruption	complete loss	600' x 100'	1	" "
	Old Field	disruption	complete loss	500' x 50'	1	" "

IMPACTS OF COMMON ELEMENTS ON NATURAL HABITATS (Continued)

Site	Affected Habitats	Short-Term Impacts	Long-Term Impacts	Acres	Potential for Affecting* Threatened or Endangered Species	Suggested Mitagative Measures
Route 3 Relocation	Cult. Field	disruption	total loss	3,828'x 120'	1	Revegetate between lanes and berms, use vegetative buffers adjacent to viable wildlife habitat.
	Old Field	disruption	total loss	4,290'x 84'	1	Revegetate disturbed areas use vegetative buffers.
	Urban	disruption	total loss	4,950'x 84'	1	" "
	Wetland	disruption	total loss	.5 acres	1	Use erosion controls - revegetate with wetland species, construct in dry season, use vegetative buffers.
Route 3 Relocation	Cult. Field	disruption	total loss	3,828'x 120'	1	Revegetate between lanes and on berm, use vegetative buffer adjacent to viable wildlife habitat.
	Old Field	disruption	total loss	1,650'x 84;	1	Revegetate disturbed areas use vegetative buffers.
	Urban	disruption	total loss	4,950'x84'	1	" "
	Wetland	disruption - filling	total loss	.5 acres	1	Use erosion control -revegetate with wetland species, construct in dry season, use vegetative buffers.
	Lentic	disruption - filling	total loss	.3 acres	2	

Current Habitat Status:

Urban habitats are well represented in the study area. It abounds with vacant lots, abandoned buildings, scrap piles and other manmade structures which may serve as cover for starlings, sparrows, rabbits, rats and other wildlife indigenous to urban habitats. The composition of the flora is principally non-indigenous species.

Agricultural fields are the second largest type in the study area and are used in row-crop production, a common land use category. The old field habitats are also fairly common in the study area. Old fields are considered transitional habitats in that they represent various stages of succession from disturbed land to a more balanced or stable habitat (such as forest or prairie). Their value is further enhanced by the fact that old fields often provide such food and cover in areas where there would otherwise be virtually no available habitat for native species.

The former extent of wetlands in the study area and the degree to which they have been depleted can be assessed by examining the detailed soil survey maps for the study area (USDA SCS 1978). Many wetland areas have been destroyed by draining or filling and the hydrological balance of others has been disrupted by elimination of input streams or alteration of watershed areas. The remaining types of wetland habitats represented here, each with its unique characteristics and wildlife values, vary from roadside ditches dominated by nearly pure stands of cattails to shallow-water lakes (such as Horseshoe Lake). These lakes show a zonation of several different characteristic wetland types and are typically the most complex in ecological development, providing a better variety of year-round food and cover for fauna than the other wetland types.

The absolute values to wildlife of these different wetland types, however, is extremely difficult to establish for two principal reasons. First, while the more vegatatively complex sites offer a more seasonally balanced food supply (and would, thus, be of greater value to resident species than those consisting almost entirely of a few species), the less

complex sites may have unusual significance to important migrating species on a seasonal basis. Second, the small size of most of the study area's wetlands and their locations directly adjacent to other habitats such as old fields, cultivated fields, and forested areas, offer the opportunity to many wildlife species to nest, breed and forage primarily in these other habitats, and to use the wetland areas only during the seasons in which they produce large food supplies.

Of the 430,592 acres which make up St. Clair County, approximately 112,000 (or 27 percent) have the types of substrates which, in their undisturbed state, could support wetland habitats. Examination of recent aerial photographs indicate that at least 90 percent of this potential wetland acreage is now in agricultural or urban use. No detailed soils survey of Madison County has yet been completed. However, field reconnaissance and examination of general soils maps, topographic maps, and aerial photographs indicates a situation similar to that in St. Clair County (USDA SCS 1970). Madison County, however, contains a greater extent of wetland habitat than St. Clair County. This habitat is centered predominantly around Horseshoe Lake and its associated drainageways. The principal wetland areas remaining in St. Clair County are in the vicinity of Frank Holten State Park.

Table 12 presents a comparison of four sites representative of wetlands in the study area along with their major plant components and their classification according to Mohlenbrock and FWS. As is illustrated by the table, the shallow-water lake sites are typically the most complex in ecological development and provide a much better variety of year-round food and cover for fauna than the other types of sites.

Both riverine and lotic (stream) habitats in the study area are heavily disturbed. The Mississippi river constitutes the primary river habitat and its condition does not support the species diversification present in less industrialized rivers. The Southwestern Illinois Metropolitan and Regional Planning Commission's (SIMAPC 1980) stream use classification for the USEPA Region V show the study area's streams as predominantly drainage ditches with low recreational value and limited floral and faunal associations. Stream fishing within the study area is

TABLE 12
COMPARISON OF FOUR REPRESENTATIVE WETLAND SITES IN THE STUDY AREA

Site	Distribution in Study Area	Classification		Typical Plants Noted in Reconnaissance
		Mohlenbrock(5)	FWS(6)	
N. of I-55-70 Junct. of Il. 157	Bordering small drainageways; drainage ditches of roads, railroads.	Non-woody seasonally flooded basin	Palustrine Emergent wetland, persistent Typha latifolia	Cattail-Typha latifolia Sedges-Carex sp.
Harding Ditch Drainage below Holten State Park Lakes	Bordering larger drainageways and lakes in depressional areas; broad, shallow depressional areas not developed or farmed.	Inland Shallow Fresh Marsh	Palustrine Emergent wetland, persistent Scirpus lineatus	Bulrush-Scirpus lineatus Cattail-Typha latifolia Sedges-Carex sp. Redtop-Agrostis alba
Long Lake S. of I-270 at Railroad Crossing	Bordering lakes and ponds.	Shrub swamp	Palustrine Shrub wetland Broad-leaved deciduous Acer saccharinun/ Salix nigra	Silver maple-Acer saccharhinun Willows-Salix sp. Box elder-Acer negundo Swamp dogwood-Cornus foemina Hibiscus-Hibiscus lasiocarpus Water locust-Gleditsia aquatica
East side of Horseshoe Lake between railroad crossing S. of Inter-Section Il.111 and Sand Road and Horseshoe Lake State Recreation Area.	Unique to large, shallow lakes - Horseshoe and Holten State Park Lakes.	Four zones Shrub swamp	Palustrine Shrub wetland Broad-leaved deciduous Cornus foemina/ Cephalanthus occidentalis	Swamp dogwood-Cornus foemina Hibiscus-Hibiscus lasiocarpus Water locust-Gleditsia aquatica Willows-Salix sp. Buttonbush-Cephalanthus occidentalis
		Inland Shallow Fresh Marsh	Lacustrine-Littoral Emergent wetland, Persistent Scripus lineatus	Bulrush-Scirpus lineatus Buttonbush-Cephalanthus occidentalis Beggar's lice-Bidens polylepsis Smartweed-Polygonum pennsylvaniean
		Inland Deep Fresh Marsh	Palustrine-Littoral Emergent, non-persistent Sagittaria latifolia	Arrowleaf-Saggitaria latifolia Sedge-Carex hyalinolepsis Cattail-Typha latifolia
		Inland Open Fresh Water	Lacustrine-Littoral Aquatic bed, submergent vascular Nelumbo lutea	American lotus-Nelumbo lutea

concentrated in the larger streams and available species consist largely of carp, buffalo, yellow bullheads, green sunfish and pollution tolerant shiners. (SIMAPC 1978)

There are three lake and pond systems within the study area. Faunal associations include invertebrates such as worms, midges and damselflies. Amphibians and reptiles include snapping turtles, painted turtles, water snakes, bullfrogs and leopard frogs (Smith PW 1961). Representative fish species include black and white crappie, bluegill, green sunfish, and largemouth bass, black bullhead, yellow bullhead, carp, warmouth, shortnose gar and gizzard shad (IDOC 1970).

The first of these lake systems is Horseshoe Lake, a 2,100 acre natural oxbow of the Mississippi. This lake is approximately 6 feet in maximum depth and has a regular shoreline which supports extensive wetland vegetation. The lake is open to public fishing, and waterfowl hunting is permitted on a daily fee basis (IDOC 1970). Commercial fishing for carp, bullhead, and channel cat is carried out on the lake.

The second lake is Long Lake, an old channel of the Cahokia Creek drainage system. This lake is approximately 85 acres in surface area, with a maximum 8 foot depth. Long Lake has a steeper shoreline than Horseshoe and, therefore, less wetland area. Due to the lake's long, narrow configuration, it is less subject to wind and wave action than Horseshoe Lake and has correspondingly lower turbidity. Long Lake's fish population is similar to that of Horseshoe Lake.

The third lake system consists of a chain of three lakes at Frank Holten State Park. These lakes total 182 acres in size. Lake 1 is 45 acres, with a maximum depth of 18 feet. Lake 2 is 123 acres, with a maximum depth of 14 feet. Lake 3 is the deepest of the three at 29 feet, with a surface area of 14 acres. All three are open to the public year-round. These lakes were originally part of the Mississippi River backwater system but were dredged and dammed in the 1930s to maintain water levels. Both their support of wetland habitat and their fish populations are similar to Horseshoe Lake.

Methodology:

The first phase of the ecological analysis was a comprehensive review of the literature concerning the past and present environment of the study area within the American Bottoms. Local, state and federal agencies were made aware that an environmental study was being conducted in the area. They were requested to forward any materials or references that would concern the ecological environment.

A review of the literature provided a strong data base for characterizing past and present environmental conditions. The Southwestern Illinois Metropolitan and Regional Planning Commission (SIMAPC) and the U.S. Army Corps of Engineers produced documents which focused on ecological and flood and drainage problems for the same area of the American Bottoms. This information laid the groundwork for the initial field reconnaissance and a characterization of land use, terrestrial, aquatic, and sensitive habitats (wetlands).

Information provided by the IDOC included an inventory of natural areas in the American Bottoms. Other references included the latest state and federal lists of rare and endangered species lists and a classification system for wetlands (USDI F.W.S. 1979). Agencies contacted are included in Table 13. The combined data will be used to determine the ecological impacts to existing natural ecological systems and determine mitigative measures.

The second phase in the ecological analysis of the study included a comprehensive field reconnaissance to determine existing land use and locate any unique or particularly sensitive habitats. The natural areas section of the IDOC provided a list of natural area within the American Bottoms. They were investigated as to their proximity to proposed construction areas and any other ecological associations.

The study area was divided according to proposed construction sites. Field teams photographed and described ecological conditions and land use

TABLE 13
LIST OF AGENCIES CONTACTED

Illinois Environmental Protection Agency
(IEPA)
Land and Noise Pollution Control
Springfield, Illinois

(IEPA) Water Pollution Control
Collinsville, Illinois

Illinois State Water Survey
Urbana, Illinois

Illinois Association of Soil and
Water Districts
Lerna, Illinois

Illinois Pollution Control Board
Chicago, Illinois

Illinois Institute of Environmental Quality
Chicago, Illinois

Illinois Department of Conservation
-Coordinator, Endangered Species Program;
-Impact Analysis Section
-Soil and Water Section;
-Division of Fisheries
-Division of Wildlife Resources;
Springfield, Illinois

Illinois Natural History Survey
Havana, Illinois

Illinois Natural History Survey
-Director's Office;
-Wildlife Research Section;
-Chief, Faunistics Section;
Urbana, Illinois

U.S. Army Corps of Engineers
-District Office
Permitting Section
St. Louis, Missouri

-District Office
Chicago, Illinois

United States Department of Agriculture - SCS
Lisle, Illinois and Edwardsville Area Office

U.S. Department of the
Interior
Fish & Wildlife Service
Regional Office
Rock Island, Illinois

U.S. Department of the
Interior
Fish & Wildlife Service
Area Office
Carbondale, Illinois

U.S. Environmental Protection
Agency
Region V
Chicago, Illinois

surrounding each rail yard, new yard and corridor which may be constructed or expanded. Crew members also followed the same procedures for rail corridors slated for expansion or renovation and the Route 3 relocation.

The reconnaissance of each area proposed for construction included a description of area size; existing land use; natural areas and their proximity to proposed construction; habitat type, size and flow of surface waters; gross floral and faunal composition; degree of disturbance; evidence of threatened or endangered species and assessment of natural area potential.

Detailed Field Reconnaissance - Sensitive Habitats:

The initial field reconnaissance and literature review provided enough information to determine the location of sensitive ecosystems which may be affected by construction. Within the project area, these systems were found primarily in the proposed common Trailer-On-Flatcar Yard (TOFC), located just northwest of I-70 and Junction Route 203 (Exhibit D). Detailed field reconnaissance was carried out in August and September 1980 in order to understand the overall ecological integrity of the TOFC Yard wetlands and those at other locations within the study area (Missouri Botanical Gardens 1976).

Publications by the Missouri Botanical Gardens (Mo. Bot. Gardens, 1976; Mohlenbrock, 1976; Hoffmeister, 1957; and Smith, 1961) were used to identify the existing floral and faunal species and characterize their preferred habitats, correlating the habitat and species occurences within the study area (Table 14). US Department of the Interior, Fish and Wildlife Service publication "Classification of Wetlands and Deepwater Habitats of the United States" OBS-79/31, December 1979, was used as the major classification system. The fauna observed in the TOFC Yard wetlands were identified as common to wetland and upland habitats. Notations were also made on wildlife tracks, dens, nesting sites and food availability.

EXHIBIT D

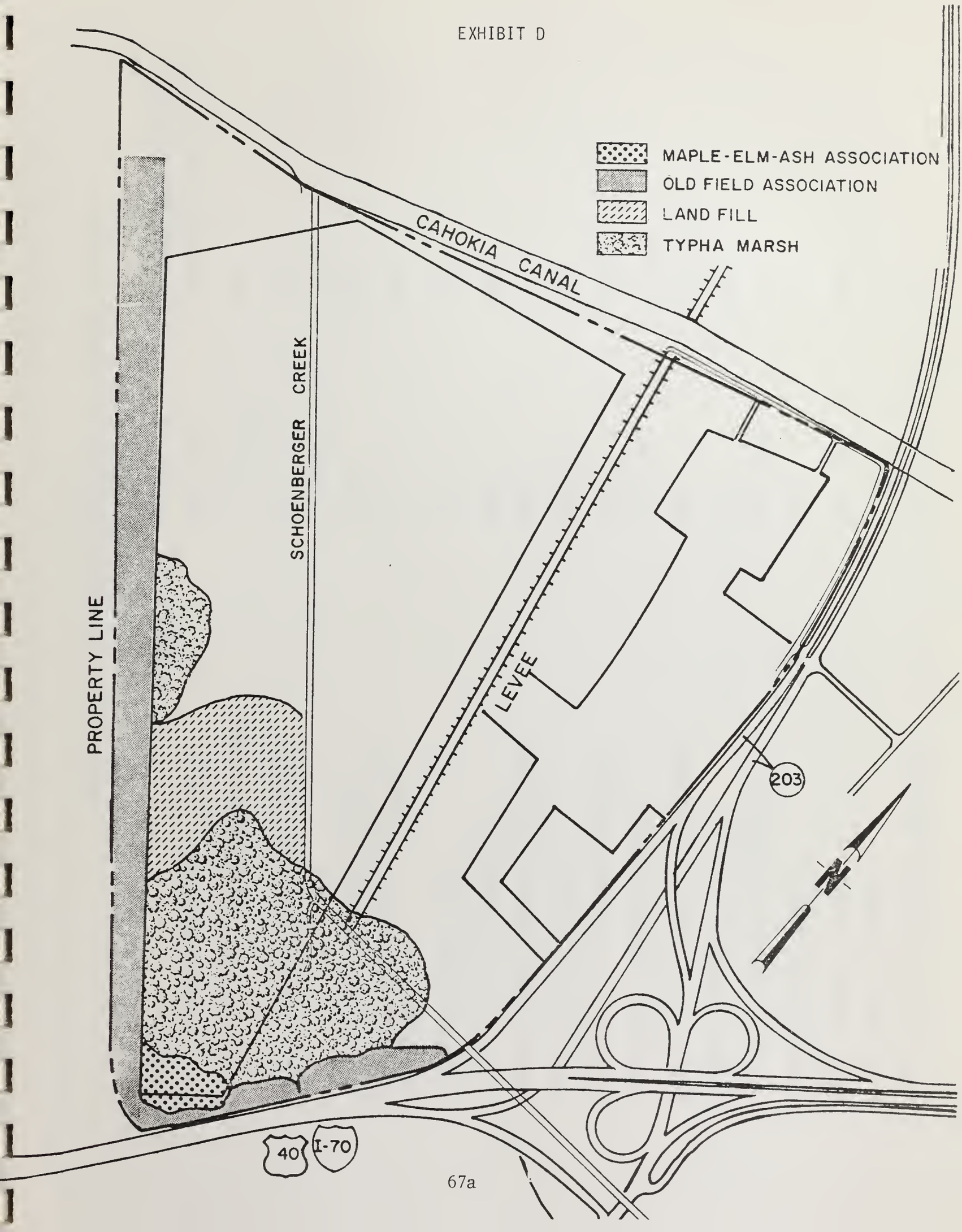
MAPLE-ELM-ASH ASSOCIATION
OLD FIELD ASSOCIATION
LAND FILL
TYPHA MARSH
CAHOKIA CANAL
SCHOENBERGER CREEK
PROPERTY LINE
LEVEE
203
40
I-70

TABLE 14
PROBABILITY OF OCCURRENCE OF ENDANGERED AND THREATENED SPECIES
IN THE PROJECT AREA (10, 11)

Organism	Status	Habitat	Probability of Occurrence
Slider Pseudemys floridana x concinna	E	Oxbow lakes	low, possibly Horseshoe Lake
Eastern Ribbon Snake Thamnophis sauritus	E	Wetlands - winters in bluffs	high
Great Plains Rat Snake Elaphe guttata	T	River bottom lands, adjacent bluffs	high
Little Blue Heron Florida caerulea	E	Marsh	high
Black-Crowned Night Heron Nycticorax nycticorax	E	Marsh	high
Snowy Egret Egretta thula	E	Marsh	high
Great Egret Casmerodius albus	E	Marsh	high
American Bittern Botaurus lentiginosus	E	Marsh	high
Common Term Sterna hirundo	E	Marsh	high
Common Gallinule Gallinula chloropus	T	Marsh	possible
Bewicks Wren Thryomanes bewickii	T	Old field	possible
Loggerhead Shrike Lanius ludovicianus	T	Edge	possible
Forster's Tern Sterna forsteri	E	Marsh	high
Bald Eagle Haliaeetus leucocephalus	F	Open water	low
Marsh Hawk Circus cyaneus	E	Marsh	high
Osprey Pandion haliaetus	E	Large river	reasonable
Veery Catharus fuscescens	T	Woodland	low
Upland Sandpiper Bartramia longicauda	E	Shoreline	low

TABLE 14(continued)

Organism	Status	Habitat	Probability of Occurrence
Indiana Bat *Myotis sodalis*	FE	Caves	possible in S. part of area
Alligator Gar *Lepisosteus spatula*	T	Mississippi River	possible
White Lady's-Slipper *Cypripedium candidum*	FE	Wetlands	high
Prairie White-fringed Orchid *Habcndria leucophaea*	FE	Swamps	possible
Oak Fern *Gym gocarpium dryopterus*	E	Deep, moist woodlands	possible SE part of area
Mud Plantain *Heteranthera reniformis*	E	Muddy shores of shallow water	possible
Beadgress *Paspalum dissectum*	E	Wet ground	low
Torrey's Bulrush *Scirpus torreyi*	E	Shores of ponds	low
Cinquefoil *Pontentilla millegrana*	E	Moist soil	low
St. John's Wort *Hypercium densiflorium*	E	Low ground	low

NOTES: FE = Federally Endangered E = Endangered in State R = Rate in Illinois
FT = Federally Threatened T = Threatened in State I = probably Extirpated

Reconnaissance in the TOFC Yard yielded the following observations: (See Exhibit D)

- Wetland Status. - Nearly all of the area is low-lying. Most of the soils are classified as poorly drained and probably once supported a viable wetland association which would have been classified* as Paulstrine, emergent wetland, persistent, seasonally flooded, Typha latifolia (cattail) dominance type. (USDI FWS, December 1979 Classification.) Due largely to development and landform manipulation in the area itself and in what was once the area's watershed, however, no such association now exists. Much of the area is now in agriculture or has been used as a landfill site.

  Two remaining low-lying sections which have not been subjected to such use, contain wetland vegetation and standing water. The combined size of these two sections is approximately 50 to 60 acres. The soils are poorly drained and the depth of the surface waters varies from 2 to 6 inches above a thick layer of organic muck. The emergent vegetation consisted solely of cattail, which may reflect the degree of interrelationship with other wetlands in the area and the quality of the surface waters draining an adjacent landfill. The complete absence of associated vegetation types which would be expected to occur there if seasonal flooding still occurred or if the water table was nearly at the surface, however, indicate that the area should be considered a stressed wetland.

  The landfill consists of crushed non-metallic scrap from automobiles. There was a complete absence of associated wetland vegetational forms. The fauna observed in these low-lying areas included red-wing black bird, green heron, cardinal, bobwhite quail, muskrat, raccoon and cottontail rabbit, all of which are tolerant of disturbed habitats, highly mobile, or migratory. All have the ability to leave the area in cases of extreme disturbance.

- Schoenberger Creek. - This creek bisects the site in a southeast-northwest direction. The creek originates in washington Park and receives drainage from urbanized areas, railroad berms, I-55/70, and the site itself, entering the Cahokia Canal near the northwest corner of the site. The total length of the creek is appoximately 4.5 miles. From its origin just west of the drainage divide between Harding Ditch and the Cahokia Canal, the creek flows through a low-lying grassed area for approximately 1/4 mile and through a concrete channel for about 1/2 mile. The aspect of the section below the concrete channel up to its passage under the interstate system is chiefly that of a large grassed ditch. In some parts of this section, however, the creek becomes wider and shallower and cattails, willows, arrowhead, and lilypads are common. The 1 1/3 mile stretch of the creek on the site itself flows first through a marshy area for approximately 2,000 feet and then through a relatively dense strip of overhanging elms, maples, and ash to the canal. The stream carries a heavy load of iron-laden silts through this area, the origin of which was not discerned. In spite of this pollutant load, however, this stretch of the stream provides either habitat or foraging area for a variety of wildlife. Noted on the field reconnaissance were: muskrat, raccoon, cottontail rabbit, bobwhite quail, redwing blackbird, cardinal, and green heron. The cover provided in this stretch of stream may be of signficance in "linking" the upper reaches of Schoenberger Creek with habitat areas of the Cahokia Canal.

Impacts of the No-Build Alternative:

For a realistic assessment of the effects of building the railroad improvements, it was necessary to estimate what the effect would be of the continuation of current conditions. The No-Build alternative will have the least impact on all construction areas. The most signficant impacts to the natural ecosystems of the area by the No-Build alternative will include a gradual loss of habitat in the construction areas by industry and urbanization with a lack of mitigation. Overall, existing habitats will remain static with an inhibited rate of vegetational succession.

Impacts on Habitats Within Construction Areas:

The design of selected build alternatives for the construction of Madison Yard, New Yard, Gateway Yard and corridor additions and interlocking modifications indicates little or no differences in impacts to natural ecosystems. Each of these construction sites is listed by alternative in Tables 9 through 11 and differences are defined. Since the differences among the alternative plans are limited, the discussion below is divided according to the impacts on the construction sites:

- Madison Yard

  Expanding Madison Yard will involve the loss of cultivated field, old field, urban and stream (Cahokia Canal) habitat (Table 8). The flora and fauna utilizing these habitats are limited by habitat size and amount of human disturbance within the area. The area of expansion (Exhibit A) is located directly adjacent to existing rail yards and site reconnaissance revealed a distinct lack of diversity in wildlife. The existing faunal forms are tolerant of human disturbance and retain the inability to relocate to less disturbed areas. Habitats within the construction area will be disrupted temporarily by construction noise, traffic and excavation. With revegetation, the long-term impacts to these habitats will be a partial loss. The potential for affecting threatened or endangered species is low due to the lack of preferred habitat and there were no sightings of these species during site reconnaissance. The loss of stream habitat (Cahokia Canal) can also be assessed using the SIMAPC classification (SIMAPC 1980) as a receiving ditch with primary usage as wastewater discharge.

- Gateway Yard

The construction will impact a variety of habitats in various stages of ecological succession, but old field is the largest habitat type affected. The majority of old fields consists of brushy vacant lots being used as indiscriminant dumping sites and abandoned areas directly adjacent to existing rail lines. There would be a partial loss of this habitat with revegetation. Cultivated field and urban habitats also border the existing yard and these habitats would also be partially lost.

Approximately 4 acres of wetland at the southern end of the yard would be incorporated into construction, however, the degree to which this area will be disturbed has not yet been defined. These wetlands consist of a dead end arm of Harding ditch and a depressed area, both containing several species of wetland vegetation (Table 15). Stream habitat being impacted includes 700 feet of Harding ditch. This ditch contains several non-game species of fish, significant amounts of riparian and aquatic vegetation and wetland faunal species (i.e., muskrat, mink, raccoon). This habitat will be impacted by the construction of a bridge over the ditch. Short term impacts will include increased turbidity and disruption by construction and excavation. The long-term impact will include a partial loss of riparian habitat. There is the potential for affecting threatened or endangered species within the wetland or stream habitats (Table 16), however, these would be highly mobile or migratory forms and easily able to relocate temporarily to less disturbed areas. There were no sightings of these species during site reconnaissance and the potential for their occurrence is lessened by the overall dimensions of the habitats and present high degree of human disturbance.

- New Yard

The construction next to Madison Yard will impact cultivated field, old field, urban and stream (Cahokia Canal) habitats. These habitats contain approximately the same vegetation types as those defined for the Madison Yard with variation in size only. The faunal components and degree of impact are also very similar to those of Madison Yard. Short term impacts will involve disruption of habitats by construction and excavation, and long-term impacts will include complete or partial loss of habitat depending on revegetation plans.

- TOFC Yard

The impacts of construction of the (Table 11) are the most ecologically significant of all impacts associated with proposed construction. The habitats involved include

wetland, stream (Schoenberger Creek), cultivated field, old field and urban. The wetland in the southwest corner of the yard is presently being filled with crushed non-metallic automobile scrap. The vegetation consists primarily of cattails and lacks a diversity of associated wetland vegetation. Wildlife using the wetlands, as noted during site reconnaissance, include redwing blackbirds and muskrats, etc. There will be a complete loss of all wetlands due to filling for the rail yard and associated TOFC parking lot.

Schoenberger Creek bisects the yard in a northeast-southwest direction for approximately 1 1/3 miles. There is a significant amount of riparian vegetation, aquatic vascular forms and wetland fauna using the creek. The water maintains a distinct orange color which is transmitted to the aquatic and riparian vegetation. There will be a complete loss of this stream habitat but a rerouting of the stream around the yard perimeter will restore it. Short term impacts will include a temporary disruption and loss of stream habitat. Long term impacts will be negligible and even enhanced with revegetation structuring and rerouting of the stream. The cultivated field and old field habitats are similar in floral and faunal composition to the Madison Yard and vary in size only.

There would be a complete loss of cultivated fields and a partial loss of old field and urban habitats which are presently under cultivation or are being used as a non-licensed refuse dump and tractor trailer repair facility. There is the potential for affecting threatened or endangered species by filling this area, however, there were none encountered during site reconnaissance, and human disturbance prior to construction has been very great. Impacts to these forms would be most severe in a short-term degree, however, long-term impacts would be negligible with rerouting and proper mitigation.

- Corridor Additions

Construction would cause the complete loss of habitat directly adjacent to existing tracks and one disruption of neighboring habitats by construction traffic and excavation. The losses will be restricted mainly to 50' wide sections paralleling existing tracks (Table 11). Cultivated fields, old fields, and urban habitat will be affected for the most part. These areas will be completely lost. Some isolated wetland habitats may also be affected, many of which arose from the borrowing of fill materials to construct the existing rail lines. Although there will be a partial loss to the total wetland area with construction, with the proper mitigation, the remaining wetlands will be

protected and in some cases enhanced. During the site reconnaissance no threatened or endangered species of flora or fauna were encountered, and considering the dimensions of these sensitive ecosystems, there appears to be a very limited potential for their being affected by construction.

o Interlocking Modifications

The construction would incorporate cultivated fields, old field, urban and wetland habitats. The interlockings vary in length with the distance of track they are to connect (Table 11). Although there would be a complete loss of cultivated field in the interlockings, old field habitats within these interlocking areas will increase as a result. Urban habitat will be partially lost with revegetation.

Wetlands associated with the interlockings will also be partially lost, however, with correct mitigation the remaining wetland will be protected and in some cases enhanced. The short-term impacts to all habitats at interlockings will be disruption by construction and excavation. The long-term impacts will include a partial or complete loss of habitat depending upon revegetation plans. The potential for affecting threatened or endangered species is low and none of these forms encountered during site reconnaissance.

o Grade Separations

Construction will take place where there is a high incidence of rail and automobile traffic conflict. This occurs in either highly urbanized or industrialized areas or on the large highways. Due to the design and location of the grade separations there will be no conflicts between construction and natural habitats with one exception. The grade separation proposed on Route 111 borders Horseshoe Lake. There is potential for the need to stablize the road bed at the extreme edge of the lake however, design of grade crossings has not been finalized and the amount of lentic habitat required, if any, cannot be assessed.

o Route 3 Relocation

The impacts of construction must be assessed under all alternatives. Each alternative involves the construction of 2 lane and 4 lane roads with median strip and berms (Table 11). The construction of the East Plan would result in a total loss of cultivated fields, old fields, urban and wetland habitats. The impacts of the loss to upland habitats would be negligible due to the dimensions of the habitats and the high degree of human disturbance presently inflicted upon the area. The wetland area affected is a

small section of the southwest corner of the Horseshoe Lake system (Exhibit B). This wetland area is presently dry with few remnants of wetland vegetation. Every year cultivation encroaches further into this area. The impact of construction on this section of wetland would be minimal due to its lack of indigenous flora forms and complete lack of wetland faunal. With proper mitigation the remaining wetland could be enhanced through revegetation. There were no threatened or endangered species encountered in either the upland or wetland habitats and due to their present dimensions and conditions the potential for their being affected is low.

The West Plan for the Route 3 relocation involves the loss of the same habitats as the East Plan (Table 11) with an additional loss of .3 acres of surface water. The surface waters are part of a 4 acre system bordering the west side of Madison Yard. This area contains typical wetland and aquatic vegetational forms (Table 15). The evidence of fauna encountered during site reconnaissance revealed them to be highly mobile or migratory, i.e., muskrats and waterfoul. The area is privately owned and there is presently no trespassing allowed. The impacts to this surface water, by construction, would be minimal with proper mitigation. The mobile wildlife forms would have access to the remainder of the area and with proper mitigation the ecological value of the area would enhanced. There were no threatened or endangered species encountered during reconnaissance of this area.

Mitigation Measures:

There were four phases of investigation implemented in determining mitigative measures for construction impacts. The first, involved a comprehensive literature search and field reconnaissance of all construction areas to identify natural ecosystems, sensitive habitats and the floral and faunal components contained within them. Phase II involved interaction with design engineers to alert them to sensitive areas within the tentative construction sites. With the finalization of construction plans, Phase III was implemented. The sensitive habitats, interspersed within the construction sites, were outlined on aerial photographs and planimetered in order to obtain the exact dimensions of each habitat. The identification of habital location, character and dimension within each of the construction sites, allowed for Phase IV, which involved the assessment of each habitat. Each habitat was

TABLE 15

WETLAND FLORA OF THE ST. LOUIS DISTRICT

The following is an alphabetical listing of vascular flora commonly found in "Section 404 Wetlands" of the St. Louis District.

Acer drummondii (Norway Maple)
Arundinaria gigantea (Cane)
Agrostis palustris
Alisma subcordatum (water plantain)
Aster dumosus (aster)
Azolla mexicana (water velvet)
Bidens polylepis (tickseed sunflower)
Brasenia schreberi (watershield)
Carex crinita
C. crus-corvi
C. hyalinolepis (sedge)
C. lupulina
C. muskingumensis (sedge)
C. vulpinoidea (sedge)
Cephalanthus occidentals (Buttonbush)
Ceratophyllum demersum (hornwart)
Cicuta maculata (water hemlock)
Cornus foemina
C. obliqua
Cyperus engelmannii
C. erythrorhizos (sedge)
C. strigosus (sedge)
Decodon verticillatus (loosestrife)
Echinochloa walteri (F. laevigata)
Eleocharis acicularis
E. intermedia
E. obtusa (barnyard grass)
E. palustris (barnyard grass)
Elodea demersum (waterweed)
Forestiera acuminata (swamp privet)
Fraxinus tomentosa (Pumpkin ash)
Gleditsia aquatica (Water Locust)
Glyceria septentrionalis
Hibiscus lasiocarpus (rose mallow)
Ilex decidua (Possum Haw)
Juncus acuminatus (rush)
J. Effusus (rush)
J. notatus (rush)
Ludwigia palustris (water purslane)
Najas flexilis (naiad)
N. minor
N. quadulupensis
Nelumbo lutea (American Lotus)
Nuphar advena (yellow pond lily)
Nyssa aquatica (sour gum)
N. sylvatica
Paspalum pubiflorum
Peltandra virginica
Polygonum coccineaum (knotweed)
P. hydropiperoides (knotweed)
P. lapathifolium (knotweed)
P. pennsylvanicum
P. sagittatum (tear thumb)
Pontederia cordata (Pickeral weed)
Populus heterophylla (cottonweed)
Potamageton crispus (much weed)
P. natans
P. nodosus

P. pectinatus
Quercus bicolor (White Swamp Oak)
Q. palustris (Pin Oak)
Ranunculus pusillus (low spearwort)
R. laxicaulis
Rosa palustris (swamp rose)
Rumex verticillatus (swamp dock)
Sagittaria latifolia (arrowhead)
Salix interior (rouleau)
S. nigra (Black Willow)
Saururus cernuus (lizard's tail)
Scirpus americanus
S. acutus
S. atrovirens (bulrush)
S. cyperinus (bulrush)
S. lineatus
S. validus
Sium suave (water parsnip)
Spartina pectinata (slough grass)
Solidago graminifolia (goldenrod)
S. patula
S. rugosa
Spirodela polyrhiza (big duckweed)
Taxodium distichum (Bald Cypress)
Teucruim canadense (wood sage)
Typha augustifolia (narrow leaf cattail)
T. latifolia (cattail)
Utricularia vulgaris (bladderwort)
Wolffia columbiana (water-meal)
W. floridiana (wolfrella)
Zannichella palustris (Horned pondweed)
Xanthium commune (cocklebur)

evaluated on its present floral and faunal content including threatened and endangered species, the potential for future habitat value and its historical interrelationship with associated habitats in the construction site and overall study area. This information led to a prioritizing of individual habitats and defining the most practicable form of mitigation as agreed upon through the interaction of the St. Louis District Corps of Engineers, USDI Fish and Wildlife Service, Illinois Department of Conservation, and the Illinois Department of Transportation.

The most extensive form of mitigation will be revegetation of areas disturbed, but not incorporated into construction. Species to be used in revegetation will be determined by surrounding habitats and land use. The methodologies used in revegetation will follow USDOT policy for construction of highways and those suggested by the USDI Fish and Wildlife Service for construction affecting surface waters in the project area. These include the planting of trees and shrubs as environmental buffers along newly created ditches for improvement of wildlife habitat. It is recommended that planting densities be 500 tree and 1000 shrub seedlings per acre. Preferred tree species include mulberry, pin oak, pecan, hackberry, osage orange and persimmon. Preferred shrubs are redstem dogwood, autumn olive, crab apple and hawthorn. An equal number of each species in each category should be planted to insure diversity and a constant food supply. These species should be readily available through commercial sources. One to two year old plants are recommended because they are cheaper and easier to plant.

The newly-created ditches and disturbed surfaces next to the ditches should be immediately revegetated to prevent erosion into the waterway. Soil Conservation Service recommendations should be followed. The recommendation for the ditch banks is:

Smooth brome	15 lbs./acre
Birdsfoot trefoil	15 lbs./acre
Timothy	3 lbs./acre
Redtop	3 lbs./acre
Alsike clover	3 lbs./acre
Reed canary grass	10 lbs./acre

The recommendation for the disturbed upland areas is:

Smooth brome	15 lbs./acre
Birdsfoot trefoil	15 lbs./acre

Erosion controls following USDOT policies will also be implemented in areas of steep relief or within close proximity to surface waters or wetlands. These controls include construction during dry periods, using sand bags or hay bales to impede surface flow, seeding and mulching. In some cases there may be no feasible alternatives for construction in a sensitive ecosystem. Mitigation may then take the form of creating alternate or replacement ecosystems as was suggested for the Common TOFC Yard and Schoenberger Creek (Table 11).

The construction of grade separations, interlocking modifications and corridor additions in some cases, will require large amounts of fill material to be used as track or road footing. Care must be taken in the selection of borrow areas, considering their ecological integrity, the impacts of physically removing the soil, and their erosion potential.

Final mitigative plans for the purchase of replacement habitats will be incorporated into the Final EIS.

Threatened and Endangered Species:

The ecological condition of the East St. Louis section of the American Bottoms has changed drastically since the early 1900s. Before this change, there were vast expanses of wetlands and bottomland forests which supported a great diversity of flora and fauna. The remaining native flora and fauna within the project area are mostly restricted to low-lying areas which were not suitable for urbanization, industry or agriculture. The remaining semi-disturbed habitats support species of animals and plants with varying degrees of tolerance to human disturbance and reduction of habitat.

Sensitive habitats (wetlands) in the study area are significant because of the variety of organisms which they support, the high probability of encountering threatened or endangered species within them, and the rapid

rate at which they have been lost to development and agriculture in the area. The sensitivity of wetlands in terms of the probabilities of encountering rare species is illustrated in Table 12. Of the 28 species shown on the table, 12 were given preliminary ratings of "reasonable" to "high" probabilities of occurrence in the study area. Ten of these are dependent on wetlands for their existence.

The Director for the endangered species program of the IDOC has supplied species lists (Table 16) for fauna known to be endangered or threatened in the American Bottoms. A cross reference was made between species known ranges and preferred habitats in order to predict their occurrence within construction area habitats. As the listing indicates, there is the potential for a variety of threatened or endangered species to exist within the project area. However, their potential for occurrence within or in close proximity to construction areas, is low due to habitat conditions and location.

The habitats that are to be acquired and incorporated in construction within each yard are described in Tables 8-11, which exhibit the alternatives, habitat types, acreages. The potential for occurrence of threatened and endangered species and mitigative measures. The IDOC and the USDI FWS have made a joint reconnaissance of sensitive habitats and wetlands that are proposed to be incorporated into construction, and will conduct additional surveys during the seasons that the threatened species are most visible.

TABLE 16
LIST OF POTENTIALLY OCCURRING THREATENED AND
ENDANGERED SPECIES IN THE STUDY AREA
ILL DOC 11-80

Endangered Mammals of Illinois	
Gray Bat[1]	*Myotis grisescens*
Indiana Bat[2]	*Myotis sodalis*
Eastern Wood Rat	*Neotoma floridana*
White-tailed Jackrabbit	*Lepus townsendii*
Threatened Mammals of Illinois	
River Otter	*Lutra canadensis*
Bobcat	*Lynx rufus*
Golden Mouse	*Ochrotomys nuttalli*
Rice Rat	*Oryzomys palustris*
Endangered Birds of Illinois	
Double-crested Cormorant	*Phalacrocorax auritus*
Snowy Egret[2]	*Egretta thula*
Great Egret[2]	*Casmerodius albus*
Little Blue Heron[2]	*Florida caerulea*
American Bittern[2]	*Botaurus lentiginosus*
Black-crowned Night Heron[2]	*Nycticorax nycticorax*
Mississippi Kite	*Ictinia mississippiensis*
Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Swainson's Hawk	*Buteo swainsoni*
Bald Eagle[2]	*Haliaeetus leucocephalus*
Osprey	*Pandion haliaetus*
Marsh Hawk	*Circus cyaneus*
Peregrine Falcon[1]	*Falco peregrinus*
Greater Prairie Chicken	*Tympanuchus cupido*
Yellow Rail	*Coturnicops noveboracensis*
Black Rail	*Laterallus jamaicensis*
Purple Gallinule	*Porphyrula martinica*
Piping Plover	*Charadrius melodus*
Eskimo Curlew[1]	*Numenius borealis*
Upland Sandpiper[2]	*Bartramia longicauda*
Wilson's Phalarope	*Steganopus tricolor*
Forester's Tern	*Sterna forsteri*
Common Tern	*Sterna hirundo*

TABLE 16(continued)

Endangered Birds of Illinois (continued)

Least Tern	*Sterna albifrons*
Black Tern	*Chlidonias niger*
Barn Owl	*Tyto alba*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
Brown Creeper	*Certhia familiaris*
Bachman's Warbler[1]	*Vermivora bachmanii*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Bachman's Sparrow	*Aimophila aestivalis*

Threatened Birds of Illinois

Common Gallinule[2]	*Gallinula chloropus*
Bewick's Wren	*Thryomanes bewickii*
Veery	*Catharus fuscescens*
Loggerhead Shrike[2]	*Lanius ludovicianus*
Swainson's Warbler	*Limnothlypis swainsonii*
Brewer's Blackbird	*Euphagus cyanocephalus*
Henslow's Sparrow	*Ammodramus henslowii*

Endangered Amphibians and Reptiles of Illinois

Dusky Salamander	*Desmognathus fuscus*
Silvery Salamander	*Ambystoma platineum*
Spotted Turtle	*Clemmys guttata*
Slider	*Pseudemys floridana x concinna*
Illinois Mud Turtle	*Kinosternon flavescens*
Broad-banded Watersnake	*Nerodia fasciata*
Eastern Ribbon Snake	*Thamnophis sauritus*

Threatened Amphibians and Reptiles of Illinois

Illinois Chorus Frog	*Pseudacris streckeri*
Western Hog-nosed Snake	*Heterodon nasicus*
Whip Snake	*Masticophis flagellum*
Great Plains Rat Snake[2]	*Elaphe guttata*

Endangered Fishes of Illinois

Bigeye Chub	*Hybopsis amblops*
Bluebreast Darter	*Etheostoma camurum*
Bluehead Shiner	*Notropsis hubbsi*
Harlequin Darter	*Etheostoma histrio*
Longjaw Cisco[1]	*Coregonus alpenae*

TABLE 16(continued)

Threatened Fishes of Illinois

Cisco	*Coregonus artedii*
Longnose Sucker	*Catostomus catostomus*
Alligator Gar	*Lepisosteus spatula*
Pugnose Shiner	*Notropis anogenus*
Blacknose Shiner	*Notropis heterolepis*
Bantam Sunfish	*Lepomis symmetricus*
Lake Whitefish	*Coregonus clupeaformis*
Lake Sturgeon	*Acipenser fulvescens*

1 Federally listed; may not breed in the project area but must be considered.

2 Species whose known breeding range includes the project area and whose habitat may be present.

Air Quality Standards:

The Clean Air Act of 1970 requires the Administrator of the USEPA to issue air quality criteria reflecting the latest scientific knowledge of the effects on public health or welfare expected from varying quantities of ambient air pollutants. Air quality criteria have been issued for the following pollutants: sulfur dioxide, carbon monoxide, total suspended particulates, photochemical oxidants, oxides of nitrogen, hydrocarbons, and lead. Based on these criteria and available pollution control techniques, the USEPA has published primary and secondary National Ambient Air Quality Standards (NAAQS) for each pollutant. These standards prescribe pollutant levels which may not legally be exceeded during a specific time period in a specific geographic area. Primary standards are designed to protect public health, while secondary standards protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air.

National primary and secondary air quality standards are presented in Table 17. Similar standards have been adopted by the State of Illinois and local air pollution control agencies.

Assessment of Macroscale Impacts on Air Quality:

Macroscale impacts of the proposed project are considered to be those effects on average air pollutant concentrations attributable to the combination of all project-related air pollutant emissions. The macroscale effects of these emissions are evaluated according to their potential to affect air quality throughout the project area and at a distance of up to 100 kilometers downwind.

As shown in Table 18, current emissions resulting from railroad operations comprise 0.3% to 5.5% of the total pollutant emissions in the Illinois portion of the Air Quality Control Region (AQCR 70), depending on the pollutant involved. Emissions of particulates, carbon monoxide, and sulfur oxides from rail operations are each 0.3% or less of total emissions, while emissions of hydrocarbons and oxides of nitrogen are somewhat more significant, compared with total area-wide emissions.

TABLE 17
NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary Standard	Secondary Standard
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean 80 g/m^3 (0.03 ppm) Maximum 24-hour* 365 g/m^3 (0.14 ppm)	Maximum 3-hour* 1300 g/m^3 (0.5 ppm)
Particulate Matter (TSP)	Annual Geometric Mean 75 g/m^3 Maximum 24-hour* 260 g/m^3	Annual Geometric Mean 60 g/m^3 Maximum 24-hour* 150 g/m^3
Carbon Monoxide (CO)	Maximum 8-hour* 10,000 g/m^3 (9 ppm) Maximum 1-hour* 40,000 g/m^3 (35 ppm)	Same as Primary Same as Primary
Ozone (O_3)	Maximum Hourly Average* 235 g/m^3 (0.12 ppm)	Same as Primary
Hydrocarbons (HC)	Maximum 3-hour* 160 g/m^3 (0.24 ppm) (6 AM to 9 AM)	Same as Primary
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean 100 g/m^3 (0.05 ppm)	Same as Primary (NO_2)
Lead (Pb)	Maximum Arithmetic Mean 1.5 g/m^3 (averaged over a calendar quarter)	Same as Primary

NOTE: *All standards with averaging time of 24 hours or less are maximum concentrations not to be exceeded more than once per year.

TABLE 18
EMISSIONS INVENTORY FOR THE RAILROAD INDUSTRY

Emission Categories	Particulates	Sulfur Oxides	Nitrogen Oxides	Hydrocarbons	Carbon Monoxide	All Five Pollutants
Total Emissions, Illinois Portion of AQCR 70 (tons per year)	282,000	655,000	197,000	104,000	2,783,000	4,021,000
Rail Emissions, Illinois Portion of AQCR 70 (tons per year)	797	1,817	10,860	3,840	3,959	21,273
Rail Percentage of Total Emissions, Illinois Portion of AQCR 70 (%)	0.3	0.3	5.5	3.7	0.014	0.05

SOURCE: References 3, 4
Assessment of Railroad Fuel Use and Emissions for the Regional Air Pollution Study USEPA, Office of Air and Waste Planning, Research Triangle Park, NC, April, 1977 EPA - 450/3-77-025

Calculations were made to determine the total area-wide (macroscale) increase or decrease in pollutant emissions from moving locomotives, for each project alternative. Total emissions are dependent on several factors, including the number of trains operating each day, the locomotives in each train (assumed to be three), the train speed (and hence, the horsepower developed by each locomotive), the load being hauled by each train, and the total running time of each locomotive. Pollutant emissions from locomotives are directly proportional to horsepower-hours, and average locomotive emission rates per horsepower-hour are presented in Table 19.

TABLE 19
LOCOMOTIVE EMISSION FACTORS
(grams/horsepower-hour)

Type of Engine	Carbon Monoxide	Hydrocarbons	Nitrogen Oxides	Sulfur Oxides	Particulates
Switch (1500 hp)	3.9-13.	5.0-8.9	11.-17.	2.0-2.5	0.9-1.1
Road (1500 hp)	1.8-4.1	0.7-4.0	8.2-10.	1.2-1.5	0.5-0.7

Source: (4) Assessment of Railroad Fuel Use and Emissions for the Regional Air Pollution Study, Office of Air and Waste Planning, Research Triangle Park, NC, April, 1977. EPA - 450/3-77-025.

In 1979, the average locomotive operating in the proposed project area developed approximately 1980 horsepower (4). Based on a projected significant increase in average speeds for any of the Year 2000 build alternatives, running locomotives will be assumed to average 2,590 horsepower for those alternatives. The increase in horsepower in itself would result in an increase in pollutant emissions. However, because of the significant increase in average speed resulting from any of the build alternatives, the total operating hours will decrease significantly.

Comparison of total air pollutant emissions from moving locomotives are summarized in Table 20. Under the No-Build Alternative, total emissions in 2000 are projected to increase, compared with 1979, by 50%. This increase is judged to result in a negligible impact on regional (macroscale) air quality with respect to particulates, carbon monoxide, and sulfur oxides.

The increase in hydrocarbons and oxide of nitrogen emissions could result in a slightly adverse effect on photochemical oxidant concentrations in the project area and downwind, as a result of chemical transformations involving these pollutants. Selection of the Two-Yard, Three-Yard Directional, or Three-Yard Bidirectional Alternatives would each result in approximately 45% fewer pollutant emissions in the Year 2000 compared with the No-Build Alternative.

The impact on regional air quality would likely be negligible with respect to carbon monoxide, particulates, and sulfur dioxide, and might contribute to a minor improvement in regional photochemical oxidant concentrations.

Assessment of Microscale Impacts on Air Quality Due to Railroad Operations:

Microscale impacts are those changes in air quality directly resulting primarily from individual point, line, or area sources within the proposed project area. Usually microscale impacts will be of relatively short duration and will extend from a few meters to a few kilometers from the source before becoming fully diluted.

During construction and dismantling activities, dust would be raised by construction and earthmoving operations. The quantity of fugitive dust from construction activities would vary depending on the area of land being worked, the level of activity, the soil silt content, the soil moisture, and wind speed. While the contribution of the proposed project to the total suspended particulates in the surrounding area will be small and of short-term duration, the construction will generate fugitive dust that may be a nuisance in nearby areas.

During construction, blowing dust from areas being cleared or excavated can be minimized in several ways. Water can be applied to unpaved raod surfaces with a sprinkler truck. On roads carrying heavy construction traffic, crushed gravel can be spread in conjunction with the normal sprinkling of the road with water. The effectiveness of watering depends on the frequency of application.

Construction vehicles will emit carbon monoxide, hydrocarbons, and oxides of nitrogen. The magnitude of air quality impacts resulting from exhaust emissions would be low, limited to the immediate area, and insufficient to cause violation of NAAQS.

TABLE 20
COMPARISON OF TOTAL AIR POLLUTANT
EMISSIONS FROM CORRIDOR OPERATIONS
FOR EACH ALTERNATIVE

Alternative	(1) Trains Per Day(5)	(2) Total Locomotive Running Time, Hrs/Day*	(3) Average Locomotive Horsepower	(4)=(2)x(3) Total Locomotive Hp-Hr/ Day (millions)	(5) Total Annual Pollutant Emissions (Metric Tons)a
1979 No Build	660	1,083	1,980	2.14	25,542
2000 No Build	849	1,626	1,980	3.22	38,432
2000 2-Yard	977	690	2,590	1.79	21,365
2000 3-Yard Directional	943	663	2,590	1.72	20,529
2000 3-Yard Bidirectional	931	663	2,590	1.72	20,529

*3 locomotives per train, as specified in Reference (4).

SOURCE: Reference 5

a Total Pollutant Emissions, metric tons per year, are computed using the following emission rates:

Carbon Monoxide	8.5 grams per horsepower-hour
Hydrocarbons	7.0 g/hp-hr
Nitrogen Oxides	14.0 g/hp-hr
Sulfur Oxides	2.2 g/hp-hr
Particulates	1.0 g/hp-hr
	32.7 g/hp-hr

Then, for example, for the 1979 No-Build Alternaitve, annual emissions are computed as follows:

$Q = 2{,}140{,}000 \text{ hp-hr/day} \times 365 \text{ days/year} \times 32.7 \text{ g/hp-hr} \times 1 \text{ metric ton}/10^6 \text{ g}$

Calculations were made to estimate pollutant concentrations in the immediate vicinity of typical railroad operations. These include concentrations at receptors 100 meters downwind of a running 3-locomotive train and 100 meters downwind of a yard where 10 locomotives are idling. The computations assume the running train is operating at full throttle, while the ten locomotives in the yard are each idling at 50 horsepower. The assumptions also included worst probable meteorological conditions ("D" stability, 1 meter per second wind speed) and were performed according to methods described in Workbook of Atmospheric Dispersion Estimates (6).

The computations indicate that downwind pollutant concentrations resulting from passage of a train operating at full throttle are negligible. The pollutant concentrations at the receptor would increase momentarily, but the effects would not be of sufficient duration to significantly affect concentration over the pertinent averaging times (1 hour, 3 hour, 8 hour, 24 hour, and annual means).

In the case of 10 locomotives idling in a yard for 1 hour, pollutant concentrations 100 meters downwind could possibly approach the standard for hydrocarbons (160 mg/m^3, three hour average). This would occur only under abnormally steady winds from a single direction over a three-hour time period. The hydrocarbon standard primarily serves to prevent production of photochemical oxidants by chemical transformation of hydrocarbons and other pollutants.

In 1979, pollutant emissions are concentrated in the two existing large railyards (Madison and Geteway), but also occur in several smaller yards, as well as along all railroad corridors. Microscale impacts on air quality in the vicinity of rail corridors is estimated to be negligible regardless of the alternative chosen. If the No-Build Alternative is selected, minor adverse impacts resulting from increased numbers of locomotives idling in the existing Madison and Gateway yards would be experienced. In this situation, three-hour average hydrocarbon standard would be susceptible to potential violations under worst case meteorological conditions. Any of the build alternatives would result in minor beneficial effects resulting from elimination of idling locomotives in some of the auxilliary rail yards located along the east bank of the Mississippi River.

These beneficial effects would be offset by adverse effects resulting from additional locomotives idling in the Gateway Yard, the Madison Yard, the New Yard (if either of the three yard alternatives are selected) and the Common TOFC Yard. Here again, the three hour average hydrocarbon concentration is the most susceptible to potential significant increases, approaching the standard.

Effects on Air Quality Due to Changes in Vehicular Traffic:

1979 Average Daily Traffic (ADT) counts at approximately 52 major highway/railroad grade crossings were compared with estimated ADT volumes at these crossings for all Year 2000 alternatives. Table 21 identifies each of these intersections and maps showing locations are included in Appendix I. The purpose of this comparison was to identify the situations resulting in the greatest increase and decrease in vehicular traffic and related air quality without mitigation (grade separation structures).

The method of analysis utilized was that specified in the Illinois Department of Transportation Air Quality Manual, September, 1978 (7) and include credit for reduced carbon monoxide levels from implementation of an Inspection/Maintenance program in 1982.

These procedures have been adopted as standard for the Department after coordination with the Illinois Environmental Protection Agency and the Federal Highway Administration. Experience has shown that if analysis of eight-hour carbon monoxide concentrations resulting from project implementation does not indicate air quality violations, in most cases other air quality standards will also not be exceeded.

TABLE 21
ST. LOUIS MARGE
GRADE CROSSING
IDENTIFICATION

NUMBER	HIGHWAY NAME	CITY
1	Maryville Road	Granite City
2	Pontoon Road	Granite City
3	Pontoon Road	Granite City
4	S. R. 162	Granite City
5	25th Street	Granite City
6	22nd Street	Granite City
7	20th Street	Granite City
8+	19th Street	Granite City
9	Niedringhause	Granite City
10	Market Street	Venice
11	Canal	Brooklyn
12	Canal	Brooklyn
13	S. R. #3-Adams	Brooklyn
14	Industrial Road	National City
15	Industrial Road	National City
16	S. R. 3	Brooklyn
17	S. R. 3	Brooklyn
18	S. R. 111	Fairmont City
19	Collinsville Road	Fairmont City
20	St. Clair	East St. Louis
21	Exchange	East St. Louis
22	Ninth	East St. Louis
23+	15th at Lincoln	East St. Louis
24	Forrest Boulevard	Washington Park
25	15th	East St. Louis
26	21st at Lynch	East St. Louis

TABLE 21 (Cont.)
ST. LOUIS MARGE
GRADE CROSSING
IDENTIFICATION

NUMBER	HIGHWAY NAME	CITY
27	St. Clair	East St. Louis
28	21st at St. Clair	East St. Louis
29	37th Street	East St. Louis
30	59th Street	East St. Louis
31+	State	East St. Louis
32	State	East St. Louis
33	Ridge	East St. Louis
34	21st at Ridge	East St. Louis
35	Martin Luther King	East St. Louis
36++	Martin Luther King	East St. Louis
37	21st at St. Louis	East St. Louis
38	Missouri	East St. Louis
39	Missouri	East St. Louis
40++	21st at Bond	East St. Louis
41+	Bond Avenue	Alorton
42+	19th Street	East St. Louis
43	Monsanto and S. R. 3	Sauget
44	Jerome Lane	Cahokia
45	Mildred	Cahokia
46	S. R. 157	Cahokia
47	E. Carondelet	Dupo
48	Mousette	Centreville
49	Bellview	Centreville
50	S. R. 157	Centreville
51	20th Street	East St. Louis
52	Black Lane	Caseyville
53	Broadway	East St. Louis

\+ Funded by Federal Highway Administration

++ Proposed for funding by Federal Highway Administration

A possible exception is the situation involving queuing of vehicles at an unimproved grade crossing, such as currently exists in the proposed project area. For this reason, maximum one-hour concentrations were also evaluated. Vehicular mix compositions and Average Daily Traffic counts were based on actual counts at specific crossings and projections for the Year 2000, as supplied by the Illinois Department of Transportation.

The eight-hour maximum volume of traffic was estimated at 63 percent of the ADT, since there were no recent studies available to document 1 hour and 8 hour maximum traffic counts. The one hour maximum traffic volume was estimated at 25% of the maximum 8 hour count. Average speeds at each intersection and the percentage of the time during which vehicles are queueing with idling engines were also incorporated into the 8 hour air quality projections according to procedures presented in Procedure for Estimating Highway Costs, Fuel Consumption, and Air Pollution (8).

For the maximum 1 hour computation, it was assumed that the queue of vehicle maintained an average speed of 5 mph for all unmitigated alternatives. (It appears unreasonable that vehicles would be operated with idle engines for periods as long as 1 hour without moving.) In all cases, worst probable meteorological conditions and a distance of 50 feet from the edge of the roadway to the receptor were assumed.

In the Year 2000, regardless of alternative, most grade crossings in the project area will experience a decrease in 8-hour carbon monoxide concentrations, due to substantially lower average vehicular emission rates and the aforementioned inspection/maintenance program. The greatest decrease in 8 hour average concentrations compared with 1979 ambient levels was computed to be approximatey 3 ppm at Crossing #43, for all alternatives.

The greatest increase in 8 hour average concentrations, compared with 1979 ambient levels, to a level of 3.8 ppm above background, would occur at Crossing #46 under the Three-Yard Bidirectional Alternative. This increase was still less than 1 ppm. Assuming an average background concentration of 2 ppm maximum 8-hour average concentrations at this and all other crossings, carbon monoxide concentrations are predicted to remain below the 8-hour standard for all unmitigated alternatives.

In the Year 2000, one-hour maximum carbon monoxide concentrations will decrease substantially at all locations, regardless of the alternative chosen, due to the combined effects of lower vehicle emission rates and the State's inspection and maintenance program. The highest 1-hour concentration is predicted to be 7.2 ppm above ambient background levels, at Crossing #43, for all unmitigated alternatives. This is well below the 1-hour maximum allowable carbon monoxide concentration of 35 ppm. Pollutant emissions at crossings where grade separation structures are proposed are discussed below.

The proposed project will include rerouting and improvement of Illinois Route 3 near the I-55/70 interchange (see the Technical Supplement entitled Route 3 Relocation). The improvement will facilitate a higher average speed, allow a doubling of the maximum hourly traffic, relocate the highway farther from most existing receptors (residences), and eliminate grade crossings. Overall, the improvement will result in air pollutant concentrations decreasing by the Year 2000 compared with current levels.

Calculations were made to evaluate the potential effects of the Illinois Route 3 improvements at Crossings 16 and 17. The calculations for 1979 assume ADT's of 4700 to 6600, an average speed of 35 mph, and that automotive traffic is blocked 10% of the time. The calculations indicate that in 1979, maximum 1-hour and 8-hour carbon monoxide concentrations are 5.9 and 2.0 ppm above ambient background levels, respectively (well below NAAQS).

For the Year 2000 No-Build Alternative, the calculations assume an ADT of 12,000, an average speed of 35 mph during the 8-hour peak period, and traffic blockages due to railroad traffic 10% of the time. For the maximum 1 hour period, assumptions include an average speed of 5 mph during the entire period. Due to the newer vehicular fleet that will be operating in the Year 2000, and the effects of the State's proposed Inspection/Maintenance program, the maximum 1-hour and 8-hour carbon monoxide concentrations are computed to be 2.0 and 1.5 ppm above background levels, respectively, again well below the NAAQS.

In the Year 2000, assumptions for all build alternatives are the same: an ADT of 15,000, average speed of 50 mph, and no traffic blockages due to railroad traffic. In addition, the computations take into consideration the substantially lower emission rates in the Year 2000 and the effects of the proposed I/M program. The calculations indicate that both the 1-hour and 8-hour maximum carbon monoxide concentrations would be less than 1 ppm.

The project will result in an increase in heavy duty vehicular traffic at the entrance to the Common TOFC yard (see the Technical Supplement entitled Common Trailer/Container-on-Flatcar Yard). Because the number of vehicles entering and leaving the yard is expected to be relatively low, there will be only a minor increase in pollutant concentrations at this location compared with existing levels.

Mitigative Measures:

Grade crossing improvements under consideration at several highway/railroad crossings (Numbers 2, 3, 19, 43, 46, and 52) would facilitate the smooth flow of traffic, insure higher average speeds through the intersections, and eliminate the queuing of the vehicles currently caused by train traffic.

The analytical methods provided in Illinois Department of Transportation's Air Quality Manual were used to predict resulting changes in maximum one-hour and eight-hour carbon monoxide concentrations at the intersections identified above in the Year 2000 resulting from grade crossing improvements. The results are presented in Table 22. As shown, concentrations at these intersections without mitigative measures are predicted to be well below the one and eight hour standards of 35 and 9 ppm, respectively. With mitigation, there would be a further decrease in one and eight hour average concentrations.

TABLE 22
COMPARISON OF CARBON MONOXIDE CONCENTRATIONS
AT INTERSECTIONS WHERE MITIGATIVE GRADE CROSSING
IMPROVEMENTS ARE BEING CONSIDERED
(concentrations expressed in ppm above background)

Alternatives	Intersection Number					
	1	3	19	43	46	52
2000 No Build						
1 hr. max.	1.3	2.2	2.0	7.2	4.7	2.2
8 hr. max.	2.4	2.4	0.8	1.4	3.6	1.2
2000 Two Yard						
1 hr. max.	1.3	2.2	2.0	7.2	4.7	2.2
8 hr. max.	2.2	2.3	1.3	1.4	3.1	1.4
2000 Three Yard						
1 hr. max.	1.3	2.2	2.0	7.2	4.7	2.2
8 hr. max.	2.1	2.2	1.3	1.4	2.8	1.4
2000 Three Yard Bidirectional						
1 hr. max.	1.3	2.2	2.0	7.2	4.7	2.2
8 hr. max.	2.1	2.2	1.5	1.4	3.8	1.8
2000 with Grade Improvements						
1 hr. max.	0.2	0.4	0.4	1.5	0.9	0.4
8 hr. max.	0.1	0.2	0.2	0.8	0.5	0.2

The predicted air quality concentrations presented in Table 22 were developed utilizing emission factors based on the assumption that the State of Illinois will implement an inspection/maintenance (I/M) program in Madison and St. Clair Counties by late 1982. This I/M Program may in itself be considered a mitigative measure. Through the I/M Program, area-wide emissions of carbon monoxide are expected to be reduced by more than 60% by 1995, with a corresponding decrease in carbon monoxide concentrations. However, computations indicate that even without implementation of the I/M Program, in the Year 2000 maximum pollutant concentrations will not exceed 1-hour or 8-hour standards.

Heavy duty diesel powered vehicles are the greatest individual contributors to air pollutant emissions at intersections. Restrictions prohibiting these types of vehicles at certain intersections during the busiest periods of the day could substantially reduce maximum concentrations, if such actions were to become necessary.

Regulation of emissions in rail yards where locomotives idle would be useful to avoid potential short-term violations of hydrocarbon standards. Proper and regular maintenance of these locomotives to insure that they are emitting at their lowest possible rate, retrofitting with pollution control devices, if possible, and spacing of vehicles so that a large amount of emissions is not clustered at a single location are possible mitigative strategies if it were proven that microscale hydrocarbon violations were occurring.

Short-term microscale impacts resulting from construction activities include exhaust emissions from construction equipment and vehicles as well as dust (particulate matter) from construction and earth-moving operation. The magnitude of vehicular emissions would not be such as to require mitigation. Dust from construction operations should be controlled through the use of mats, sodding, and planting as well as through frequent sprinklings with water on dry, windy days.

CONCLUSIONS

The primary effects of the MARGE project on the area's natural environment fall into two main categories - the loss of prime farmland and the loss of natural habitats. The impacts on soils, floodplain hazards, and air and water quality would not be severe and can be mitigated using accepted construction practices. The loss of prime farmland, however, requires more consideration, as does the loss of sensitive ecological habitat.

The proposed construction sites with newly acquired properties include Madison Yard, New Yard, Gateway Yard, corridor additions and renovations, corridor interlocking modifications, and the Route 3 relocation alternatives. The properties to be acquired for these sites have been investigated and the habitat descriptions and dimensions are included in Table 6. The habitats included in the overall land acquisitions are: old field, agricultural land, wetland, riverine, stream, and urban habitats. The impacts of construction include short-term disruption and, in some cases, complete loss of habitat.

The largest area of ecological significance subject to alteration by construction is the TOFC Yard just southwest of the Route 70-203 intersection. This yard is included with all "build" alternatives. The area is presently being land filled with non-metallic automobile scrap. However, there still exists approximately 50 to 60 acres of wetland and 1-1/3 miles of stream habitat which supports a variety of indigenous floral and fauna species. The possibility exists that this wetland may provide habitat for threatened or endangered species indigenous to the study area. The United States Department of the Interior, Fish and Wildlife Service (FWS) and the Illinois Department of Conservation (IDOC) participated in a reconnaissance of the area. The fact that none of the target species were encountered during the survey does not preclude their presence. Further observations will be conducted and mitigative actions will proceed on the assumption that such species may occur in the study area. Specific measures can include habitat protection or replacement. Decisions will be made and implemented in concert with representatives of IDOC and FWS.

The same areas containing sensitive habitats also include prime farmland. The location of the rail facilities in an area rich in agricultural land makes it virtually impossible to construct any improvements without encroaching on some prime farmland. Throughout the environmental studies, efforts have been made to minimize the taking of such land and, where possible, to recommend construction in areas contiguous to existing development. Parcels of land are scattered among the construction sites - 92 acres of Gateway Yard; 25-35 at Madison Yard; 50 at New Yard and 105 at the TOFC Yard.

Ninety percent of this acreage is presently under cultivation, for a total of 125 acres to be affected by the Two-Yard Plan and approximately 200 acres under either of the Three-Yard Plans. All of this land is located contiguous to developed areas with existing sewer water and utility lines. In these cases, the acquisition and construction is not expected to encourage development into other prime agricultural areas.

The TOFC Yard, on the other hand, is located in an unincorporated area and will require the installation of new sewer and water connections. The association of the proposed site with existing highways and rail corridors, however, makes it an optimal location for a rail/highway transfer point. In addition, the fact that the entire project area may be defined as "urban fringe", will affect its growth potential so that urban activity could be expected to encroach on the site within the next two decades whether the yard were built or not. Consideration of the farmland issue was included in the decision process, and the weighing of all factors resulted in the selection of this site. During and after the construction all the facilities, as far as practicable, all guidelines for the preservation of prime agricultural lands will be observed.

(1) American Association of State Highway and Transportation Officials, 1978, Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Part I Specifications, American Association of State Highway and Transportation Officials.

(2) American Society for Testing and Materials, 1976, 1976 Annual Book of ASTM Standards, Part 19, Natural Building Stones; Soil and Rock; Peats, Mosses, and Humus, American Society for Testing and Materials.

(3) Baker, W. H., Jr., 1972, Groundwater Levels and Pumpage in the East St. Louis Area, Illinois 1967-1971, Illinois State Water Survey Circular 112, Urbana, Illinois, 29 p.

(4) Bergstrom, Robert E. and Walker, Theodore R., 1956, Groundwater Geology of the East St. Louis Area, Illinois, Illinois State Geological Survey Report of Investigations 191.

(5) Bridgeman, Lee. December 1980. Area Conservationist, Soil Conservation Service, Personal Communication.

(6) CONSAD Research Corporation, 1977, St. Louis Railroad Gateway Terminal Restructuring Project-Phase I, U. S. Department of Transportation, Federal Railroad Administration.

(7) Cooper, Gregg, December 1980. Soil Scientist, Soil Conservation Service. Personal Communication.

(8) Fehrenbacher, J. B., et al, 1978. Soil Productivity in Illinois, Circular 1156, University of Illinois, Personal Communication.

(9) Fehrenbacher, Joe, December 1980. Professor of Pedology, University of Illinois, Personal Communication.

(10) Flint, Richard Foster, 1971, Glacial and Quaternary Geology, John Wiley and Sons, Inc.

(11) Illinois Department of Transportation, Ecological and Natural Resources Manual, George B. Rose, Editor - Revised 1978.

(12) Illinois Environmental Protection Agency, Division of Land/Noise Pollution Control, Unpublished Date. Rec'd EEI Offices, May 17, 1979.

(13) Illinois State Water Survey, Unpublished Date. Rec'd EEI Offices April 6, 1979.

(14) Jacobs, Alan M., 1971. Geology for Planning in St. Clair County, Illinois: Illinois State Geological Survey Circular 465, Urbana, Illinois, 35 p.

(15) Piskin, Kemal, and Bergstrom, Robert E., 1967, Glacial Drift in Illinois: Thickness and Character, Illinois State Geological Survey Circular 416.

(16) Reitz, G. E., Jr., 1968, Groundwater Levels and Pumpage in the East St. Louis Area, Illinois 1962-1966, Illinois State Water Survey Circular 95, Urbana, Illinois, 30 p.

(17) Schicht, R. J., 1965. Groundwater Development in East St. Louis Area, Illinois, Illinois State Water Survey Report of Investigation 51, Urbana, Illinois, 70 p.

(18) Smith, Guy D., 1942, Illinois Loess, University of Illinois Agricultural Experiment Station Bulletin 490.

(19) Southwestern Illinois Metropolitan and Regional Planning Commission, 1978. 208 Water Quality Management Plan, Volume I, Environmental Inventory, Madison, St. Clair, and Monroe Counties, Illinois.

(20) U. S. Department of Agriculture, Soil Conservation Service, 1978. Correlated Soil Mapping Units that Qualify as Prime Farmlands in Illinois. Champaign, Illinois.

(21) U. S. Department of Agriculture, Soil Conservation Service, 1970. General Soils in Formation and Interpretation. Madison County, Illinois, Ill 9-275, Washington, D.C.

(22) U. S. Environmental Protection Agency. Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity. Washington, D.C. EPA 430/9-73-007, October 1973.

(23) Wallace, D. L., 1978. Soil Survey of St. Clair County, Illinois, U. S. Department of Agriculture, Soil Conservation Service, St. Clair County, Illinois.

(24) Westenhoff and Novick, a predecessor company of Envirodyne Engineers, Inc., Consulting Engineers, 1971, Roadway Soils Report, Interstate Highway Route 255.

(25) Willman, J. B. and John C. Frye, 1970. Pleistocene Stratigraphy of Illinois: Illinois State Geological Survey, Bulletin 94, Urbana, Illinois.

(26) Yarbrough, Ronald E. and Rose Chiste, 1972. The Physical Regions of the American Bottoms, Guidebook, A.A.G. Field Seminar, St. Louis, Missouri

(27) Yarbrough, Ronald E., 1973. "Geological Elements", Section II of Environmental Inventory Report Part A, East St. Louis and vicinity, Illinois, Harding Ditch Combined Area, St. Clair County, Illinois.

REFERENCES FOR THE WATER QUALITY CHAPTER

(1) Illinois Pollution Control Board Rules and Regulations, Chapter 3, Water Pollution, as amended.

(2) Horner and Shifrin, Inc., prepared for the U. S. Army Corps of Engineers, St. Louis District. East St. Louis and vicinity, Illinois, Harding Ditch Combined Area, St. Clair County, Illinois; Environmental Inventory Report, Part A. August, 1973.

(3) Horner and Shifrin, Inc., prepared for the U. S. Army Corps of Engineers, St. Louis District, Blue Water Area, St. Clair County, Illinois; Environmental Inventory Report, Part A. 1974

(4) Phase 1 of the Water Quality Management Basin Plan for the Mississippi South Central River Basin. Illinois Environmental Protection Agency, July 1, 1976. Volumes 1-4.

(5) Water Quality and Wastewater Treatment Plan, Madison, St. Clair and Monroe Counties, Illinois, Volume 1. Southwestern Illinois Metropolitan and Regional Planning Commission, January 1975.

(6) Water Resources Data for Illinois, Water Year 1977. U. S. Geological Water Survey - Data Report IL-77-1.

(7) Water Quality Management Interim Plan, East St. Louis Intensive Study Area, St. Clair County, Illinois. Southwestern Illinois Metropolitan and Regional Planning Commission, Collinsville, Illinois. October 1972.

(8) Staff Assessment - Mineral Extraction (Preliminary Draft). Southwestern Illinois Metropolitan and Regional Planning Commission. June 16, 1977.

(9) Staff Assessment - Agricultural Erosion and Sedimentation (Preliminary Draft). Southwestern Illinois Metropolitan and Regional Planning Commission. July 7, 1977.

(10) Staff Assessment - Pesticides (Preliminary Draft). Southwestern Illinois Metropolitan and Regional Planning Commission. May 27, 1977.

(11) Chemical Analyses of Surface Water in Illinois, 1958-74, Volume III, Ohio River Tributaries and Mississippi River Tributaries South of Illinois River Basin. By R. W. Healy and L. G Toler. U. S. Geological Water Survey - Resources Investigations 78-24, prepared in cooperation with Illinois Environmental Protection Agency. 1978.

(12) General Report: Volume III, Water Quality Assessment, Madison, St. Clair and Monroe Counties, Illinois. Southwestern Illinois Metropolitan and Regional Planning Commission. April 1, 1978.

(13) General Report: Volume III, Water Quality Assessment, Madison, St. Clair and Monroe Counties, Illinois. Southwestern Illinois Metropolitan and Regional Planning Commission. April 1, 1978.

(14) 208 Water Quality Management Preliminary Draft Report on Areawide Plan, Madison, St. Clair, and Monroe Counties, Illinois. January 1978.

(15) Background Survey, Surface Drainage Program, Madison, St. Clair, Monroe, and Randolph Counties, Illinois. Southwestern Illinois Metropolitan Area Planning Commission. April, 1973.

(16) Staff Assessment - Urban Storm Water Runoff (Preliminary Draft). Southwestern Illinois Metropolitan and Regional Planning Commission, July 13, 1977.

(17) Plan for Major Drainage: The American Bottoms and Hillside Drainage Area Planning Basin. Southwestern Illinois Metropolitan and Regional Planning Commission, August, 1975.

(18) General Report: Volume I, Environmental Inventory. Southwestern Illinois Metropolitan and Regional Planning Commission, April 1, 1978.

(19) Madison County Surface Water Resources. Roy Lockhart, Illinois Department of Conservation, Division of Fisheries. January 1970.

(20) St. Clair County Surface Resources. Peter J. Paladino, Illinois Department of Conservation, Division of Fisheries, January 1972.

(21) Facilities Plan and Environmental Assessment, East St. Louis Facilities Planning Area. Metcalf & Eddy, Inc. December 1976.

(22) Locks and Dam No. 26 (Replacement), Environmental Study, Upper Mississippi River Basin, Mississippi River - Alton, Illinois, Missouri, and Illinois. Prepared by Harland Bartholomew and Associates for U. S. Army Corps of Engineers, St. Louis District. April 1974.

(23) Southwestern Illinois Metropolitan and Regional Planning Commission, 1980. Classification of Stream Uses in Madison, St. Clair, and Monroe Counties, Part I), Collinsville, Illinois.

(24) Illinois Department of Transportation, 1977. Water Quality Manual, Springfield, Illinois.

LIST OF REFERENCES FOR NATURAL HABITATS CHAPTER

(1) Anderson, R., and P. Bauer. 1968. A guide to finding birds in the St. Louis area. Webster Groves Nature Study Soc., St. Louis, Missouri. 44 pp.

(2)* Barstow, C. J. 1970. Impact of channelization on wetland habitat in the Obion-forded Deer Basin, Tennessee. Trans. 36th N. Amer. Wildlf. Conf.: 362-375

(3)* Barstow, C. J. 1971. Impact of channelization on wetland habitat in the Obion-forked Deer Basin, Tennessee. 20-28. In: E. Schneberger and J. L. Funk (eds.), Stream Channelization: A Symposium, Amer. Fish. Soc. Spec. Publ. No. 2.

(4) Belrose, F. C., Jr. 1944 a. Bald eagles nesting in Illinois. Auk 61(3):467-468.

(5) Bellrose, F. C., Jr. 1968. Waterfowl migration corridors east of the Rocky Mountains in the United States. Illinois Nat. Hist. Surv. Biol. Notes No. 61. 24 pp.

(6) Benson, D., and R. F. Perry. 1965. An acre of marsh is worth. . . New York State Conserv. 19(6):30-33.

(7) Bent, A. C. 1926. Life histories of North American marsh birds. Dover Publications, Inc., New York. 392 pp.

(8) Blus, Lawrence J. 1966. Some Aspects of Golden Mouse Ecology in Southern Illinois. Transactions of the Illinois State Academy of Science. 59(4):344-341.

(9) Bohlen, David. Illinois State Museum, bird specialist. Personal communication.

(10) Brandon, R. A., and N. R. Austin. 1966. Notes on a collection of amphibians and reptiles from Monroe County, Illinois. Trans. Illinois State Acad. Sci. 59(3):296.

(11) Cochran, D. M., and C. J. Goin. 1970. The new field book of reptiles and amphibians. G. P. Putnam's Sons, New York. 359 pp.

(12) Cory, Charles Barney. 1909. The Birds of Illinois and Wisconsin. Field Museum of Natural History Publication 131, Zoological Series, Volume IX. Chicago, Illinois 764 pp.

(13) Emerson, John W., 1971. Channelization: A Case Study, Science, Vol. 173, pp. 325-326.

(14) Envirodyne Engineers, Inc., 1979. Environmental Resources Inventory of Wood River Basin, Illinois, prepared for Illinois Department of Transportation, Springfield, Illinois.

(15) East-West Gateway Coordinating Council, 1974. Park and Recreation Areas Plan for the St. Louis Region, 1995, St. Louis, Missouri.

(16) Fawks, Elton. Bald Eagle Research, East Moline, Illinois. Personal communication.

(17) Fawks, Elton. Bald Eagle Research, East Moline, Illinois. Personal communication.

(18) Federal Register, 1979. Water Resources Project Type Activities; Channel Modification Guidelines; proposed rules, Vol. 44, No. 248, December 26, 1979. Washington, D.C.

(19) Flieg, G. M. 1972. The Illinois American Bottoms: Summer birding area of Illinois. Audubon Bull. 161:31-32.

(20) Forbush, E. H., and J. B. May. 1955. A natural history of American birds of eastern and central North America. Bramhall House, New York. 552 pp.

(21) George, W. G. 1971. Vanished and endangered birds of Illinois: A new 'black list' and 'red list." Audubon Bull. 157:2-11.

(22) Goff, C. C. 1952. Flood-plain animal communites. Am. Midl. Nat. 47(2):478-486.

(23) Graber, Jean W., and Richard R. Graber. 1973. Nesting Distribution of the Veery in Illinois. Illinois Audubon Bulletin, Illinois Audubon Society. 1973(164):50-52.

(24) Graber, Richard R., Jean W. Graber, and Ethelyn L. Kirk. February 29, 1972. Illinois Birds: Turbidae. Illinois Natural History Survey, Biological Notes No. 75.

(25) Hoffmeister, D. F., and C. O. Mohr. 1957. Fieldbook of Illinois mammals. Illinois Nat. Hist. Surv. Manual 4. 233 pp.

(26) Hoslett, S. A. 1961. Effects of floods on mammal distribution. Proc. Iowa Acad. Sci. 68:260-263.

(27) Illinois Environmental Protection Agency, 1975. Biological Fish Survey - Mississippi Basin, Wood River, Springfield, Illinois.

(28) Illinois Environmental Protection Agency, 1979. 208 Water Quality Management Plan, Volume IV, 208 Water Quality Management Planning Program, Springfield, Illinois.

(29) Illinois Department of Conservation, 1976. Department policy concerning stream channelization, from Manual Code 3332.1, Springfield, Illinois.

(30) Illinois Environmental Protection Agency, 1974. A Biological Investigation of Wood River in the Vicinity of Alton-East Alton, Illinois, Springfield, Illinois.

(31) Illinois Department of Conservation, January, 1970. Madison County Surface Water Resource. Division of Fisheries, Springfield, Illinois.

(32) Illinois Department of Conservation, November, 1979. Illinois List of Endangered and Threatened Plants. Illinois Register.

(33) Kartesz, J. T. and R. Kartesz, 1977. The Biota of North America Vol. I, Rare Plants, International Council for Outdoor Education.

(34) Kleen, Vernon. Illinois Department of Conservation. Director, Non-Game, Rare and Endangered Species. Personal communication.

(35) Klimstra, W. D., and J. L. Roseberry. 1969. Additional observations on some southern Illinois mammals. Trans. Illinois State Acad. Sci. 62(4):413-417.

(36) Klimstra, W. D., and T. G. Scott. 1956. Distribution of the rice rat in southern Illinois. Chicago Adad. Sci., Nat. Hist. Misc. 154:1-3.

(37) Lockart, R., 1970. Madison County Surface Water Resources, Illinois Department of Conservation, Division of Fisheries, Springfield, Illinois.

(38) Lopinot, A. C. and Philip W. Smith. May 1973. Rare and Endangered Fish of Illinois. Illinois Department of Conservation, Division of Fisheries. Springfield, Illinois. 53 pp.

(39) McDonald, D. B., 1975. A Comparison of Fishes from Three Small Streams in West Central Illinois, Unpublished.

(40) Missouri Botanical Garden, 1976. An Introduction to the Biological Systems of the St. Louis Area.

(41) Mohlenbrock, R. H., 1976. An Inventory of Rare and Endangered Plant Species found in the St. Louis, Missouri, Corps of Engineers District.

(42) Mohlenbrock, R. H., and J. Voigt. 1959. A flora of southern Illinois. Southern Illinois Univ. Press, Carbondale, Illinois. 390 pp.

(43) Mohlenbrock, R. H., and J. Voigt. 1965. An annotated checklist of vascular plants of the Southern Illinois University Pine Hills Field Station and enviorns. Trans. Illinois State Acad. Sci. 58(4):268-301.

(44) Mohlenbrock, R. H. 1959. A floristic study of a southern Illinois swampy area. Ohio J. Sci. 59(2):89-100.

(45) Montz, G. 1972. A seasonal study of the vegetation on levees. Castanea 37(2)140-146.

(46) National Cooperative Highway Research Program Report, December, 1979. Ecological Effects of Highway Fills on Wetlands. Transportation Research Board, Washington, D.C.

(47) Odum, E. P. 1971. Fundamentals of ecology. 3rd ed. W. B. Saunders Company, Philadelphia, London and Toronto. 574 pp.

(48) Odum, E. P., and H. T. Odum. 1972. Natural areas as necessary components of man's total environment. Trans. 37th No. Am. Wild. Nat. Res. Conf. 1972:178-189.

(49) Putz, F. L. and J. E. Thompson, 1972. The Fishes of Prairie DuPond Creek, St. Clair County, Illinois, Transactions of the Illinois State Academy of Science, 65(3&4).

(50) Schwegman, John E. June 1973. Comprehensive Plan for the Illinois Nature Preserves System -- Part 2 The Natural Divisions of Illinois. Illinois Nature Preserves Commission. 32 pp.

(51) Smith, Harry R., and Paul W. Parmalee. 1955. A Distributional Checklist of the Birds of Illinois. Illinois State Museum Popular Science Series Volume IV. Springfield, Illinois. 62 pp.

(52) Smith, P. W., and P. W. Parmalee. 1954. Notes on distribution nd habits of some bats from Illinois. Trans. Kansas Acad. Sci. 57:200-205.

(53) Smith, Philip W., November, 1961. The Amphibians and Reptiles of Illinois. Illinois Natural History Survey Bulletin, Volume 28, Article 1. Urbana, Illinois. 298 pp.

(54) Smith, Philip W., November 1971. Illinois Streams: A Classification based on their fishes and an analysis of factors responsible for disappearance of native species. Illinois Natural History Survey Biological Notes Number 76. Urbana, Illinois.

(55) Smith, P. W., 1979. The Fishes of Illinois. Illinois Natural History Survey, University of Illinois Press.

(56) Smith, S. L., 1969. The Fishes of Piasa Creek, Transactions of the Illinois State Academy of Science, 62(1).

(57) Southwestern Illinois Metropolitan and Regional Planning Commission, (SIMAPC), 1976. Plan for Major Drainage, The Piasa Creek, Wood River Creek and Cahokia Creek, Planning Basins Division of Water Resource, Springfield, Illinois.

(58) Southwestern Illinois Metropolitan and Regional Planning Commission, March, 1980. Stream Use Classification, Collinsville, Illinois.

(59) Southwestern Illinois Metropolitan and Regional Planning Commission, April, 1978. Environmental Inventory of Madison, St. Clair and Monroe Counties, Illinois. General Report, Vol. 1, 208 Water Quality Management Plan.

(60) Reference U.S. Army Corps of Engineers, St. Louis District. 1974. Flora and Fauna of the Mississippi River and Floodplain between St. Louis and Cairo, Illinois.

(61) USDA Soil conservation Service, 1978. Soil Survey of St. Clair County, Illinois. Illinois Agricultural Experiment Station Soil Report No. 104.

(62) U.S. Department of Agriculture (USDA), Soil Conservation Service in Cooperation with the Illinois Agricultural Experiment Station, the Madison County Soil and Water Conservation District, Madison County Board of Supervisors, and the Southwestern Illinois Metropolitan Area Planning Commission, 1970. General Soils Information and Interpretation, Madison County, Illinois, Collinsville, Illinois.

(63) Turner, L. M. 1931. Plant succession on levees in the Illinois River valley. Trans. Illinois State Acad. Sci. 24(2):94-102.

(64) USDI Fish and Wildlife Service, July 14, 1977. Endangered and Threatened Wildlife and Plants Office of the Federal Register.

(65) U.S. Department of the Interior, Fish and Wildlife Service, 1979. Classification of Wetlands and Deepwater Habitats of the U.S. FWS/OBS-79/31.

(66) U.S. Department of the Interior, Fish and Wildlife Service, May, 1974. United States List of Endangered Fauna. Washington, D.C. 22 pp.

(67) U.S. Department of the Interior, Fish and Wildlife Service. July 1, 1975. Threatened or Endangered Fauna of Flora. Federal Register. 40(127):27824-27924.

(68) U.S. Environmental Protection Agency, 1976. Impacts of Construction Activities in Wetlands of the United States. Corvallis, Oregon; EPA-600/3-76-045.

(69) U.S. Department of the Interior, FWS, December, 1980. Review of Plant Taxa for Listing as Endangered or Threatened Species. Vol. 45, No. 242 Federal Register.

(70) Voigt, J., and R. Mohlenbrock. 1964. Plant communities of southern Illinois. Southern Illinois Univ. Press, Carbondale, Illinois. 202 pp.

(71) Wetzel, R. M. 1958. Mammalian succession on midwestern floodplains. Ecology 39: 262-271.

(72) Yeager, L. E., and H. G. Anderson. 1944. Some effects of flooding and waterfowl concentration on mammals of a refuge area in central Illinois. Am. Midl. Nat. 31(1):159-178.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 121950247